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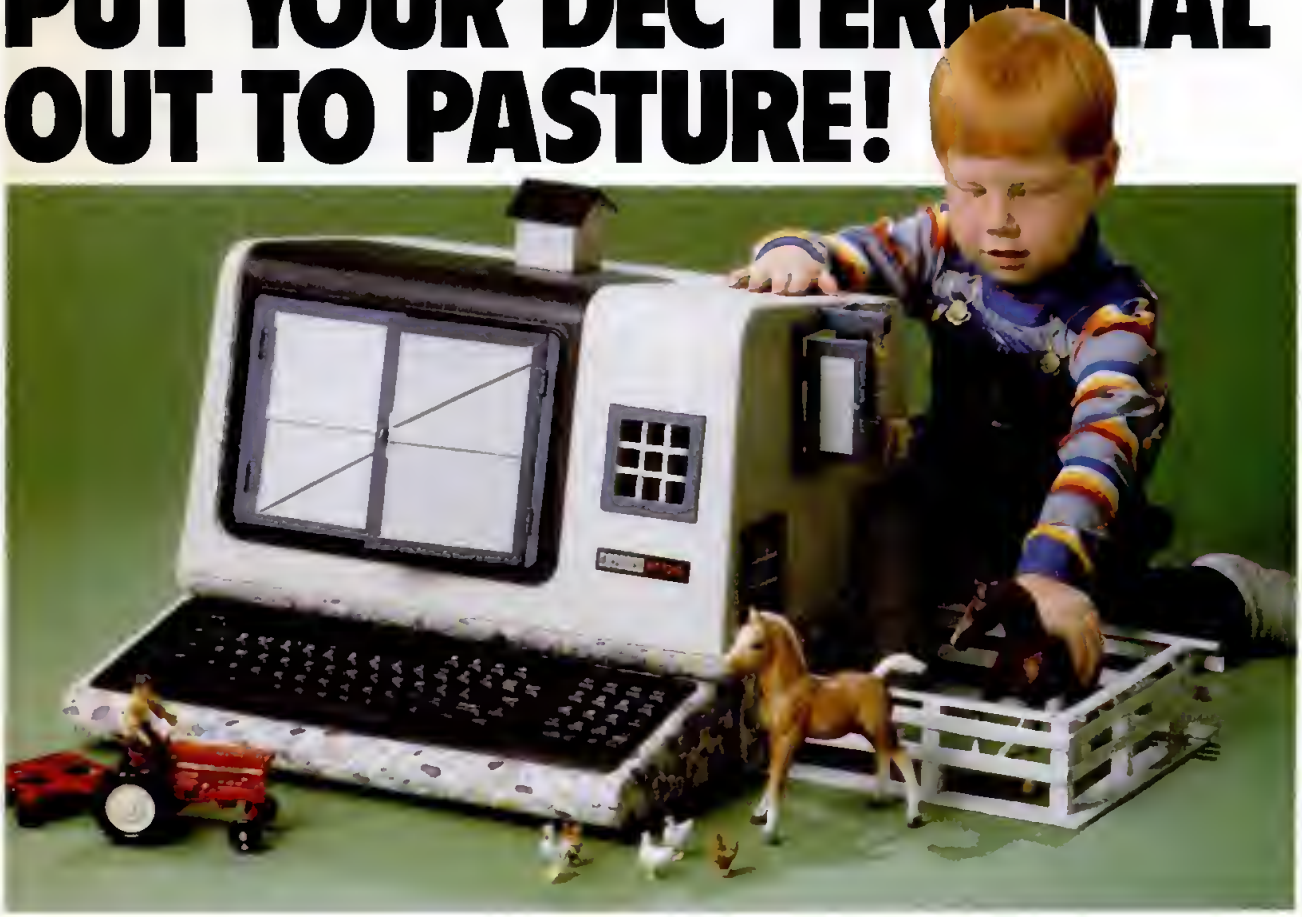
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VOLUME 4 NUMBER 25 • DECEMBER 10, 1985

FEATURES



COVER STORY

Lightning Strikes 112
A Spark of Lightning 119

Bill Machrone and Paul Somerson/
Borland International's new Turbo Lightning is the first application package of the new age that will be ushered in by gigabyte disk storage. Better, it has features you can use today, on your existing system. Lightning's most visible capability is instant spelling checking and thesaurus—for virtually every program in your library—but its capabilities are far greater. It will be able to extract information from a wide range of reference works and indexed, unchanging information.

GIFTWARE

A PC Wish Book 145

*Christina Dyar/*Christmas gift ideas for the consummate PC user from Rainbow diskettes to the Apple LaserWriter.

HARDWARE

9 Laptops to Go 124

*Alfred Poor, Jon Pepper, Stephanie Stallings, and Paul M. Stafford/*Lightweight portables have evolved from limited novelty items into powerful productivity tools for the business traveler. Whether you're commuting to work by train or flying to Bangkok for a meeting, laptops can be indispensable companions. Reviewed here are the Tandy 200, Visual Commuter, Heath ZP-150, Morrow Pivot II, Panasonic Executive Partner, Ericsson Portable PC, Hewlett-Packard Portable PLUS, Data General/One, and Quadram Datavue 25.



The Hardcard: A 10-Meg Marvel 160

*Winn L. Rosch/*Plus Development's Hardcard is a complete hard-disk-based mass storage subsystem on a single expansion card. Easy to install and faster than a traditional XT fixed disk, the Hardcard is a miracle of miniaturization.

COLUMNS/DEPARTMENTS

WHAT'S INSIDE 15
A behind-the-scenes glimpse into the making of *PC Magazine*.

PC NEWS 33
Nine pages of up-to-the-minute news, product minireviews, interviews with the industry's movers and shakers, short features, and commentary.

FROM THE EDITOR'S SCREEN
The Networking Nightmare 61
*Bill Machrone/*In its brief life span, local area networking has undergone radical changes. It still looks the same on the surface, but the ownership equation is completely different.

LETTERS TO PC MAGAZINE 67

THE NORTON CHRONICLES
Starting the Search for Lost Files 83
*Peter Norton/*Part 1 of a short series on how disks work.

PC PERSPECTIVES
The New Challenger in the Word Processing Wars 91
*Jim Seymour/*While *MultiMate* and *DisplayWrite* are busy slugging it out for the top spot in the high-end word processing market, Lotus is preparing to drop the bomb next year with a new concept—a smart word processor.

COMPUTERS IN SOCIETY
Computers and Apartheid 99
*Stan Augarten/*Has the presence of the computer industry in South Africa helped change the apartheid system or merely propped it up?

PROGRAMMING/UTILITIES
Green Screen 1-2-3 Graphics ..283
*Charles Petzold/*In this issue, *1-2-3* is taught how to draw bars and graphs on monochrome displays without auxiliary boards or code changes.

SPREADSHEET CLINIC 291
*Jared Taylor/*A *Symphony* macro that adds only selected figures in a column, plus menu and memory tips.



page 251

FASTLINK: Communicating at 10,000 bps and Up 251
M. David Stone/IRMA's appropriately named FASTLINK modem speeds along at 10,000 bps, or roughly 1,000 characters per second. Digital Communications Associates achieves this blazing speed with an innovative approach that also lets the modem communicate at traditional slower rates such as 2,400 bps.

LANGUAGES
APL: Daring to Be Different 167
Bob Smith/Interpreter-based APL is a programming language that has attracted enthusiastic followings in both the scientific and business communities with its unique ability to get applications up and running quickly.

SOFTWARE
When Good Form Matters 215
Stephanie Stallings/*MonoGrafx*, *Computerized Presentation System*, *FormTool*, and *Diagram-Master* structure your information in an attractive form by designing flowcharts, schedules, and forms for gathering data.

Printer Utilities Make the Difference 259
Alfred Poor/Printer utility programs can make the most of your printer's myriad features without a lot of fuss. Here's a close look at nine super utilities that can persuade your printer to perform enhancement tricks for you.

SPECIAL REPORT
Words into Type: Meeting the Corporate Challenge 180
Diane Burns and S. Venit/In-house publishing departments, which generate training materials, brochures, newsletters, and reports, are switching to PC-based systems that bypass costly manual layout and paste-up. Laser printers, typesetting front-end software, and page-composition programs let corporate publishing departments produce slick, attractive pages.



Laser Printers at the Cutting Edge 184
PCs and Typesetters: A Mixed Marriage 199
Page Design on the PC Screen 202

TRAINING
Getting the Most for Your Seminar Dollar 233
Sandy Jones/Computer seminars can help bridge the information gap between the idealized world of software manuals and the way most programs operate in actual use. But do the specialized classes deliver what they promise and teach you what you really need to know? Learn how to invest your time and money wisely in personal computer seminars.

POWER USER 295
Paul Somerson/*WordStar* productivity-enhancing tips from our readers include setting the border color, expanding the screen to 43 lines of text, a super file stripper, changing the function key settings, getting rid of bottom line help, and faster program starts.

USER-TO-USER 305
Paul Somerson/A file protector, how to unprotect a protected BASIC program, and color screen tricks.

REVIEWS IN BRIEF 313
David Obregón/Nissho dot matrix printers and a shoebox accounting system for the twentieth century.

THE SHORT REPORT 315
Phil Wiswell/Taming your hard disk the easy way, Part 2.

NEW ON THE MARKET 317
David Obregón/A portfolio evaluator, a system that transfers document files, a presentation graphics program, a Spanish-language spelling checker, and other nifty new products.

PC TUTOR 325
Charles Petzold/Adding the clock/calendar feature, customizing cursors, and dealing with power problems caused by air conditioners.

PC:MART 328

PC BLUEBOOK 330

READER SERVICE CARD ... 341

PRODUCT INDEX 345

BOOK REVIEW
Two Tutorials for dBASE III ... 349
David Obregón/*Using dBASE III* and *dBASE III for the Programmer* give valuable advice.

INDEX TO ADVERTISERS ... 355

COMING UP 359

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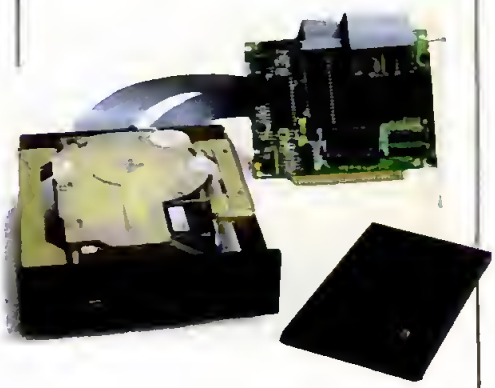
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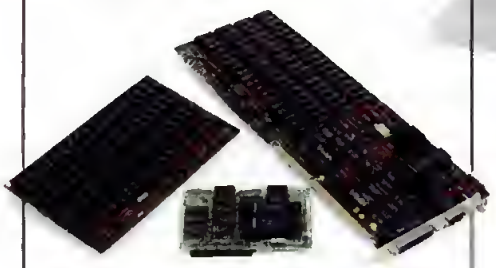


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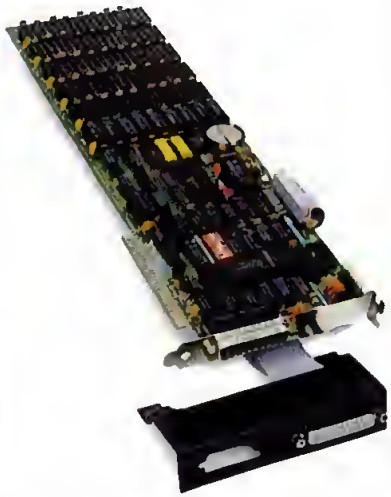
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RGB Color Monitors Feature .31mm Dot Pitch And Large 14" Screen • HR31-200 Compatible With IBM Color Graphics Adapter (640x200) • HR31-350 Compatible With Enhanced Graphics Adapter (640x350) • Monochrome Monitors Have IBM Compatible 720x348 Resolution On 12" Diagonal Screen.

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QUBIE'

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Camarillo, California 93010

CIRCLE 483 ON READER SERVICE CARD

HAUPPAUGE

Our 287 FAST/5 Gives your IBM PC/AT A Lesson in Speed.



Now, When the Subject Turns to Fast Math, Your AT Will Get an A+.

Right now, the 80287 math Coprocessor in your PC/AT runs at 4MHz. Which means there's room for improvement. That's why Hauppauge has developed the unique 287 FAST/5—a module that gives your AT an unmatched 5MHz capability. Speeding up your math computations by 25%. Now that's an A+ performance! To insure easy installation, we've created a carrier mount for our 287 FAST/5. Just plug the module into your PC/AT's 80287 Numeric Coprocessor socket. No expansion slot required.

products listed below, you can get Recalc for only $49 (suggested retail price is $95).

87 CHIP **$129**
Our 8087 Math Coprocessor for the IBM PC, PC/XT and PC compatibles.

87-2 CHIP **$229**
8 MHz Math Coprocessor for Compaq Desk-Pro and Olivetti PC's.

287 CHIP **$249**
80287 Math Coprocessor chip that runs at 4MHz in the IBM PC/AT.

287 FAST/5 **$249**
Our 80287 Math Coprocessor enhancement module that boosts speed in the IBM PC/AT to 5MHz.

1·2·3 GETS A LESSON IN SPEED, TOO!

Introducing Hauppauge's New Lotus Support

In addition to our 287 FAST/5, Hauppauge has recently developed a Lotus 1-2-3 support package that can accelerate your calculations up to 30 times. The package? Our 8087 coprocessor chip and Recalc™ software. Recalc links your Lotus 1-2-3 program to the fast math capability of our 8087 chip. By sending numeric operations to the 8087, computation time can be reduced from 60 seconds to as little as 2 seconds. And the more complex the calculation, the more time you save!

Affordability

We've raised the speed limit for Lotus 1-2-3 and lowered the cost of Recalc software. When you buy any of the Hauppauge

Now Available! The 287 FAST/8 **$379**
In addition to our 1-2-3 support, we're introducing our new 287 FAST/8—a module that gives your IBM PC/AT an unprecedented 8 MHz capability. Doubling the speed of your math calculations! (module pictured above)

Hauppauge's 287 FAST/5 and Lotus support package are teaching the IBM PC, PC/XT and PC/AT a thing or two about fast math. Learn more by calling us today—or contact your local computer dealer.

Hauppauge Computer Works
358 Veterans Memorial Highway, Suite MS1
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Available from your local computer dealer

Advertising: Scali Communications, San Francisco

CIRCLE 119 ON READER SERVICE CARD

Hauppauge
(Pronounced: "Ha-pog")

We acknowledge the following registered trademarks: IBM PC, PC/XT and PC/AT: International Business Machines; Lotus 1-2-3: Lotus Development Corporation; Recalc: GMP

INSTANT GRATIFICATION

Pop Up 8 Powerful Tools, Including A Word Processor, Any DOS Command—Even Your Favorite Application—At The Touch Of A Key

A. SATISFIED CUSTOMERS ARE THE BEST PORM OF ADVERTISING—LISTEN TO WHAT POP-UP™ DESKSET™ USERS SAY:

New York Times, Erik Sandberg-Diment—When it comes to overall ease of use and efficiency, Pop-Up DeskSet Plus is probably the winner.

Computer Buyers Guide & Handbook, Paul Rothweiler—DeskSet Plus rates and gets from CBG & H the highest of marks.

InfoWorld—DeskSet has taken the Sidekick idea a step further.

Byte, Mark Welch—I found DeskSet's Pop-Up Calculator to be the best for office work.

PC World, Danny Goodman—Financial Calculator is the height of functionality. Perhaps the best feature of Pop-Up DeskSet Plus is the Clipboard when used in tandem with a recent addition called Pop-Up Anything.

Business Software—Pop-Up PopDOS is an almost necessary addition to the operating system.

Computer Retailers' Guide, Mick Taylor—The DeskSet is a very powerful set of tools that is both flexible and easy to use.

Online Today, Ernest Mau—Pop-Ups add flair to operations and enhance computer utility.

Cummins Engine Co., Ivan Myers—Much better than the competition (know anyone who wants to buy a "Sidekick"? $25).

J. P. Edmunds—It is so good, your computer is not complete without it.

Hewlett-Packard, Samson Espartero—Very impressed with automatic/timed program execution.

Atlantic Richfield Co., Craig Parker—For the first time I can use my printer options!

On the Wing, William Gross—Outstanding!

State Law Library, Austin, Texas, Jim Hambleton—I find PopDOS very helpful in arranging documents on my data disk when using WordStar.

Planning Research Corp., William Hand—It is a big help in keeping me on schedule.

IRT Corporation, Jack Wilson—Very useful and easy to learn and use.

W. E. Tickel—Your whole line of products is invaluable, attractively packaged, and beautifully documented. Keep up the fine work!

Robert Newman—Excellent—meets my needs better than Sidekick.

David Gleason—It's great for dBase development to be able to print, rename, view files without exiting.

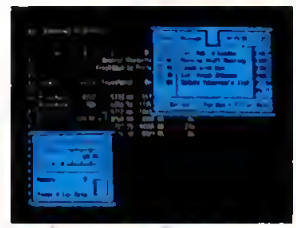
Professional Business Equipment, Inc.—Works very well on a multiuser environment. Customers have been very impressed. We expect to sell them with many of our systems.

B. COMPARE POP-UP DESKSET WITH WHAT THE COMPETITION OFFERS—NO OTHER DESKTOP PACKAGE EVEN COMES CLOSE:

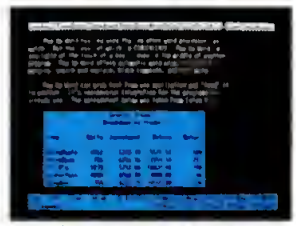
	Pop-Up DeskSet	Sidekick™	Spotlight™
Automatic word wrap	YES	No	No
Word processor files unlimited in size	YES	No	No
Search and replace	YES	Yes	No
Block commands (copy, move, delete)	YES	Yes	No
Keystrokes required to paste 20 lines of numbers into spreadsheet	6	52	Can't
Adjustable margins	YES	Yes	No
Scheduler message size	UNLIMITED	36char	35char
Alerts you to appointments	YES	No	Yes
Stop watch/elapsed time feature	YES	No	No
Start programs at specific time (unattended operation)	YES	No	No
Display time constantly	YES	No	No
Date stamp documents	YES	No	No
Calculator has on-screen and printable tape	YES	No	No
Does financial calculations (interest, annuities, etc.)	YES	No	No
Statistical analysis mode (standard deviation, etc.)	YES	No	No
Allow user access to any DOS command	YES	No	No
Allow user to run any program while within another	YES	No	No
Set up printer while in an application	YES	No	No
Use printer as electronic typewriter	YES	No	No
Auto dial phone numbers	YES	Yes	No
Tools entirely RAM-resident	YES	No	No
Load only what you want/ expand as needed	YES	No	No

C. POP-UP DESKSET IS THE RIGHT CHOICE—AT THE RIGHT PRICE Pop-Up DeskSet gives you Pop-Up Word with Scheduler and cut-and-paste, Alarm Clock, Calendar, Standard and Financial Calculator, Phone Dialer, PopDOS Utilities and Pop-Up Anything—enables you to run a second application anytime. All non-copy protected, and all for $69.95* (Sidekick is $84.95 for less.)

Step up to Pop-Up DeskSet and save 50% Turn in your Sidekick and we'll send you Pop-Up DeskSet for $35—that's ½ off.



Here is Lotus 1-2-3 with Pop-Up Alarm Clock and Calculator



Here is Pop-Up Word demonstrating cut-and-paste capability, with import from Lotus 1-2-3 highlighted.

Pop-Up DeskSet in more than one computer and save 50%
Popular Programs, Inc. offers a multiple computer licensing plan that gives you ½ off on up to 10 additional copies of Pop-Up DeskSet. Your company needs more than 10? Call 206 822-7065 for further information.

Why you'll want to spend $60 more if you have a Hayes-Compatible Modem
Pop-Up DeskSet Plus has something no other desktop package has: Pop-Up TeleComm, a high-speed telecommunications program. And like all the Pop-Ups, TeleComm is available instantly—at the touch of a key; $129.95*

TELECOMMUNICATIONS	Pop-Up TeleComm	Sidekick Spotlight	Smart Com II™	Cross Talk XVI™
Available any time (at a keystroke)	YES	No	No	No
Feed text directly from service to application program	YES	No	No	No
Send and receive text and binary files	YES	No	Yes	Yes
Hayes modem baud rates supported	300/1200 2400	None	300/1200 2400	300/1200 2400
Direct connect baud rates supported	110-9600	None	110-9600	110-19.2k
Specifically supports PBX and long distance services	YES	No	No	No
Automatically logs on to service	YES	No	Yes	Yes
VT-52/VT-100 terminal emulation	YES	No	Yes	Yes

Use our toll-free number to order direct:

1-800-44-POP-UP

(1-800-447-6787)
Available through
500 DEALERS coast-to-coast
and through major distributors

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(206) 822-7065 Telex via WUI: 6502697172 MCI

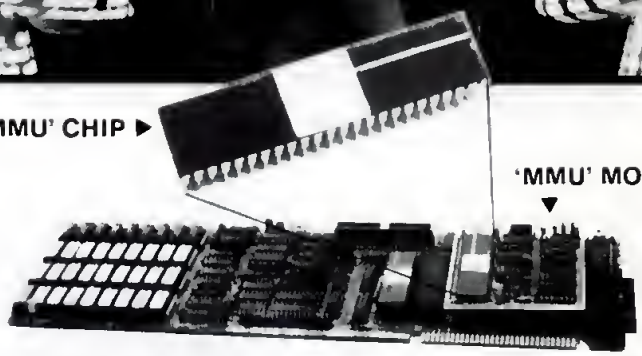
System requirements: IBM PC, XT, AT, 3270 PC, PCjr or compatible
Telecommunications require a PC or XT
Pop-Up, Pop-Ups, DeskSet are trademarks of Popular Programs, Inc
Sidekick is a trademark of Borland International
Smart Com II is a registered trademark of Hayes Microcomputer Products, Inc.
Cross Talk XVI is a registered trademark of Microstuf, Inc
Spotlight is a trademark of Lotus Development Corporation

*Prices quoted are for U.S. only

CIRCLE 103 ON READER SERVICE CARD

THIS IS NOT BS (Bank-Switching)





THE NEW BREED OF MULTIFUNCTION CARDS.

ALL CARD AT1

With AST SIXPAK, QUADBOARD, JRAM, or the newer INTEL ABOVE BOARD, you limit your PC growth. The **ALL CARD AT1** is expandable to 2MB on board (4 MB in two slots) and FULL MEGABYTE POWER with the ALL "MMU" Module Option. **ALL CARD AT1** starts with all the multi-function features and 256K at $445. Even the standards are designed for software of the future —the calendar clock has non-volatile RAM with alarm interrupts and the serial port has multiple addresses. Also, mix 64 & 256K chips.

ALL CARD AT1/M

This model comes equipped with all the features of **ALL CARD AT1** plus the ALL 'MMU' Module Option which includes ALL/MOS (Memory Operating Software). With a simple menu-driven installation procedure, ALL/MOS converts your existing software to 1MB DOS, and delivers FULL MEGABYTE POWER.

'FULL MEGABYTE POWER'

1 MEGABYTE DOS. Break the 640K barrier. Run existing versions of the popular business packages IN 1 MB including 1.2.3, SYMPHONY, FRAME-WORK, dBASE, APL, TOPVIEW, SIDEKICK, MULTILINK, CROSSTALK, TURBO PASCAL, C86, IBM MACRO ASSEMBLER, MULTI-MATE, WORDSTAR, NOVELL, PC NET.....

4 MEGABYTE EXPANDED MEMORY SPEC. Run 4 megabyte software conforming to the LOTUS/INTEL/MICROSOFT specification,with enhancements. SYMPHONY 1.1 has already been released and 1.2.3, FRAMEWORK and others are coming.

MULTI-MEGABYTE, MMU PROTECTED RAM DISK. Run **ALL DISK** as large as you like with full assurance that it is fully hardware protected from inadvertent tampering by you, others, or programs with 'bugs'.

FUTURE INDUSTRY EXTENDED MEMORY SPEC. Run higher performance software conforming to the future specification for machines equipped with MMU. IBM PC AT is IBM's first personal computer with MMU. With **ALL CARD** your PC and XT also have MMU.

Full megabyte power means you can run all of the above either individually or together. And more. Provide Memory Management Unit (MMU) hardware for DOS/UNIX and other multitasking, multiuser and VM (Virtual Machines) operating systems of the future.

IBM is a registered trademark of International Business Corporation. UNIX is a registered trademark of Bell Laboratories. 1-2-3; Symphony; Framework; APL; Topview; Above Board; AST; Sixpak, Quadboard; JRAM; INTEL; dBASE; Sidekick; Multilink; Crosstalk; Turbo Pascal; C86; Multi-Mate; Wordstar; NOVELL; PC NET are trademarks of the respective companies. **ALL CARD** is a trademark of **ALL Computers Inc.**

ONLY ALL CARD™ WITH 'MMU' FOR THE IBM PC, XT & COMPATIBLES DELIVERS FULL MEGABYTE POWER FOR SYMPHONY, 1-2-3, FRAMEWORK, APL, TOPVIEW . . . ABOVE BOARD, AST, QUADRAM AND OTHERS WITH BS CAN'T DO IT. IBM PC AT CAN'T DO IT.

Memory is the single most important part of a computer. A faster CPU can save you minutes, but more memory can save you hours. More memory consolidates multiple jobs and spreadsheets into a single run. The result is the job is simpler to design, faster to run, and much less error prone. Picking the right method to expand memory is vital to the future life of your PC. This is what the industry is saying about 'MMU' and Bank- Switching . . .

PC Magazine—*May 14, 1985*

"Several industry leaders have echoed . . . concern that (Bank-Switching) is only a stop gap measure on the way to full use of . . . on chip memory management (MMU). PC Magazine shares that concern."

PC Week—*April 16, 1985*

"MMU, a function that controls how memory is addressed, is more sophisticated than Bank-Switching techniques"

PC Magazine—*June 11, 1985*

"Spring COMDEX The introduction of a memory expansion card **(ALL CARD)** *with full memory management facilities for 4 megabytes of on-board PC RAM was one of the more exciting of these developments"*

". **(ALL Computers Inc.)** *seems to have stolen a march on the major board makers"*

Personal Computing—*August, 1985*

"Alone and away from the din over Bank-Switching technology a four megabyte, multifunction board **(ALL CARD)** *that allows almost all software to utilize its memory right out of the box."*

There is clearly only one way of the future—full memory management! In the past, Bank-Switching was obsoleted by MMU with mainframes and again with minicomputers—and now with personal computers. **ALL CARD** gives you the best of both worlds — 4 MB LOTUS/INTEL/MICROSOFT Expanded Memory Specification (Bank-Switching) and 1MB DOS (MMU) today, and Extended Memory Specification (MMU) tomorrow.

ALL CARD stands alone with its proprietary MMU CHIP for the IBM PC—it alone offers you the future today.

SPECIAL TRADE IN OFFER

Trade in your AST Sixpak, Quadboard, JRAM or other old multifunction card and free up an expansion slot in the process. **ALL Computers Inc.** is offering up to $400 towards the purchase of an **ALL CARD AT1/M.** Offer is limited. Act now! Trade it in or leave it in and add the **ALL CARD** to your PC.

ALL Computers Inc.

102 Bloor St., W., 12th Floor,
TORONTO, CANADA M5S 1M9.

CIRCLE 357 ON READER SERVICE CARD

(416) 960-0111 TELEX 06-986766

Ven-Tel's Half Card™ modem is in all the best computers. Here's why...

Ven-Tel gives you lots of reasons to buy our Half Card™ modem for your IBM PC or compatible. The Half Card™ is a complete system that lets you communicate with other PCs, mainframes, and databases effortlessly. It includes Crosstalk-XVI® software. It's reliable. It's got all of the features you want. And it's a good value.

Do You Own One of These Computers?

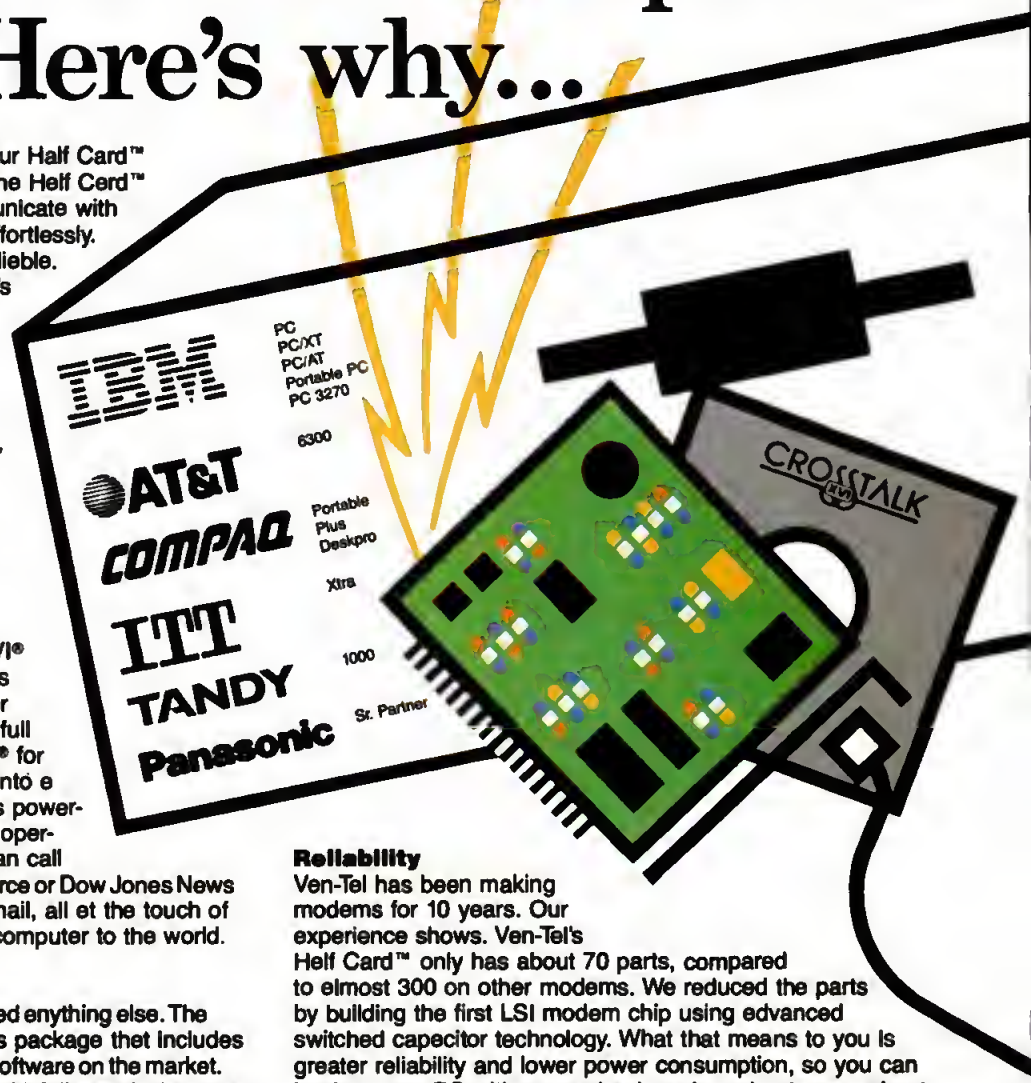
Chances are you do. And if you're thinking of buying a modem, consider the Half Card™. Because of its small size, the Half Card™ fits in more computers, including all of the models we've listed here. The Half Card™ is small, so it fits in short slots or long. That means you can save your long slots for other expansion uses.

Effortless Communication

Each Half Card™ comes with Crosstalk-XVI® communications software, by Microstuf. It's the easiest to use, whether you're a beginner or an old hand, and the most powerful. A full on-line help menu makes using Crosstalk® for the first time a snap. It can turn your PC into a terminal on a mainframe computer with its powerful terminal emulation feature. It will even operate your PC when you're not there. You can call into an information service such as The Source or Dow Jones News Retrieval, or transfer files and electronic mail, all at the touch of a button. The Half Card™ connects your computer to the world. Effortlessly.

More Modem for Your Money

When you buy the Half Card,™ you don't need anything else. The Half Card™ is a complete communications package that includes a full-featured modem and the best known software on the market. Complete easy-to-understand instructions with full technical support on installation and use. And a very competitive price. The Half Card,™ with Crosstalk-XVI® software, retails for only $549.



Reliability

Ven-Tel has been making modems for 10 years. Our experience shows. Ven-Tel's Half Card™ only has about 70 parts, compared to almost 300 on other modems. We reduced the parts by building the first LSI modem chip using advanced switched capacitor technology. What that means to you is greater reliability and lower power consumption, so you can load up your PC with expansion boards and not worry about heat or power problems. And we back the Half Card™ with a full two-year warranty on parts and labor.

Features

- 1200/300 baud auto-dial, auto-answer.
- Uses the industry standard "AT" command set.
- Runs with virtually all communications software, including Smartcom II and PC Talk III and integrated packages such as Symphony and Framework.
- Includes Crosstalk-XVI® software.
- On-board speaker and extra phone jack for easy switching from voice to data mode.
- Selective tone or pulse dialing; full or half duplex.
- Automatic answer on any ring.
- True ring or busy signal detection.



You Can Buy the Half Card™ Anywhere

You can get the Half Card™ at ComputerLand, Businessland, the Genre Group, Entré Computer Centers, Macy's Computer Stores and other fine dealers nationwide. Also from Ven-Tel: the 1200 Plus,™ an external modem and the PC Modem 1200,™ an IBM internal with V.22 international capability.

Effortless Communication

Ven-Tel Inc.

2342 Walsh Avenue
Santa Clara, CA 95051
(408) 727-5721

Crosstalk is a registered trademark of Microstuf, Inc. Smartcom II is a trademark of Hayes Microcomputer Products. Symphony is a trademark of Lotus Development. Framework is a trademark of Ashton-Tate.

CIRCLE 364 ON READER SERVICE CARD

What's Inside

We were privileged to be the only publishing beta site for Borland International's *Turbo Lightning*. Our cover story was produced behind triple-locked doors that would have done even IBM proud.

It was remarkable. Editor Bill Machrone caught on immediately. Executive editor Paul Somerson was right behind him. Exec editor Barry Owen needed a little interpretation, but when he understood what he was seeing, his jaw dropped.

The threesome from PC Magazine was spending a perfect July day visiting hardware and software companies south of San Francisco. Pretty routine stuff: examining new products, talking to the people who come up with ideas for new products, and generally poking around Silicon Valley.

Machrone and company did not know in advance what they would see at Borland International, the Scotts Valley company that developed Turbo Pascal, SuperKey, and Sidekick. What they saw, what caused their eyes to pop, was a product code named "Rambo." The real name is Turbo Lightning. You can read all about it starting on page 112.

Laptop computers are showing up in all the best places—on transatlantic flights, in four-star hotels, and on the laps of powerful executives. In "9 Laptops to Go" (page 124), Alfred Poor, Jon Pepper, Stephanie Stallings, and Paul Stafford put the latest crop of portables through their paces. Here's a sneak preview of the results: The Morrow Pivot II, a favorite around here, wins points for its readable screen. The Tandy 200, which we like to borrow for business trips, garners praise for its no-frills sturdiness and true portability. The Panasonic Executive Partner gets qualified kudos for tucking a thermal printer into a portable case.

Stocking Stuffers

Not even the smallest laptop can fit in a Christmas stocking, so you'll have to come up with some other gift ideas for your friends and family. To help you out, we've assembled "A PC Wish Book" (page 145). It's loaded with large and small goodies to bring your PC good cheer this season.

A gift we'd like to receive is the Hardcard from Plus Development Corp. Winn Rosch found that this streamlined hard-disk-on-an-expansion-board lives up to all its manufacturer's claims—it's even speedier than a standard XT hard disk! (See "The Hardcard: A 10-Meg Marvel," page 160.) We also like the new-wave graphics on the packaging and the nifty sticker that identifies your PC as the home of a Hardcard.

Publish or Perish

In the corporate world, it's publish or perish these days. Companies rely on printed material to disseminate information to employees and the public, but if their published pages aren't slick and enticing, they may not get read. Writers Diane Burns and Sharyn Venit investigated the latest developments on the PC-based corporate electronic publishing front, from laser printers to page composition software, and found that a $10,000 investment can turn your in-house publishing department into a state-of-the-art concern. See "Words into Type: Meeting the Corporate Challenge" (page 180) for the details.

At *PC Magazine* we often find excitement in the most unexpected places. When Charles Petzold stopped by with this issue's Programming column ("Green Screen 1-2-3 Graphics," page 283), our technical editor Craig Stark went wild. MONOGRAF.DRV, which lets you display *1-2-3* bar charts on your monochrome monitor, knocked the socks off our usually distinguished technical editor, and he dashed around the office telling everyone, from the proofreaders to the publisher, "You've got to see this program!" Don't miss it. ■

High Fidelity



Why high fidelity boards feed your IBM better data. Longer.

On a turntable, high fidelity means no hiss, no static, no noise.

It means the same in a computer.

No noise is good noise.
Your IBM "reads" data as a series of ones and zeros. But with some expansion boards, you get small amounts of radio frequency interference—noise—that can make a one look like a zero. Or vice versa.

That's called data error.

And if it happens in column 27 of your spreadsheet, the result can be disastrous.

Silent partner.
On a Computer Peripherals High Fidelity Board, we've used wider traces to carry the signal. So there's less noise. And a multi-layer construction makes our boards run cooler and last longer. No noise and no heat mean no data error.

Worth finding.
Computer Peripherals High Fidelity Boards are available as memory expansion up to 512K, multi-function and other configurations for IBM personal computers.

If you value your data, a Computer Peripherals board is worth finding. Call (800) 854-7600 and find out where.

computer peripherals
High Fidelity Computer Components

2635 Lavery Court #5
Newbury Park, California 91320
(800) 854-7600 • In California, (818) 710-1717

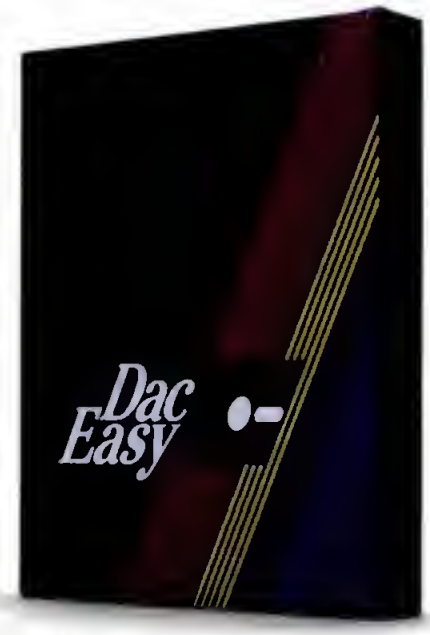
CIRCLE 502 ON READER SERVICE CARD

"Dac-Easy Accounting is a genuinely amazing deal."

PC Magazine, October 15, 1985

"I've never before in a review come right out and told readers to buy a product, but I'm doing it now. Dac-Easy is an incredible value."

PC Week, August 27, 1985



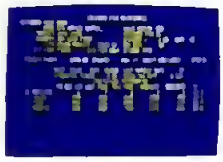
"Amazing". "Incredible". "Unbelievable". That's how the industry's most important reviewers describe Dac-Easy Accounting—Dac Software's feature-packed, fully integrated accounting package priced at only $69.95. They compare it favorably to accounting packages (sold module by module) costing up to five thousand dollars!



Seven powerful, integrated modules

But it's more than our price that has the critics raving. Compare our features to those of *any* other accounting package at *any* price.

Dac-Easy Accounting offers instant access to General Ledger, Accounts Receivable, Accounts Payable, Inventory, Purchase Order, Billing and Forecasting. Perfect integration between all seven modules gives you fast, accurate, flexible management of information. Data entered once is *automatically* posted to all pertinent modules. And Dac-Easy is designed to manage both product *and* service oriented businesses.



Three-year history maintained, with forecasting

Only Dac-Easy maintains a three-year history on all principal files, and provides spreadsheet-like forecasting based on this history. Plus, you can generate any of 300 different reports for instant access to the exact information you need.

Find out for yourself why Dac-Easy is the fastest selling accounting package in history. Call us today!

Dac Easy /Accounting

$69.95

"Dac-Easy is remarkable, amazing, revolutionary, sensational..."

Computer Buyer's Guide & Handbook
September 1985

PARTIAL LIST OF FEATURES

General Information
- Menu driven
- Password protection
- File capacity limited only by disk space
- Support contract available

General Ledger
- Unlimited multi-level accounts
- Three-year account history for CRT inquiry
- Pencil and pen feature to correct mistakes
- Unique budgeting routine
- CRT transaction inquiry
- Activity report, trial balance, financial statements, unlimited departments and journals

Accounts Receivable
- Open invoice or balance forward
- Customized aging report
- Unlimited number of customers
- Flexible mailing labels and directories
- Supports partial payments & finance charges
- Three-year customer history for number of invoices, sales, costs, and profits
- Customized statements
- Cash flow analysis/sales analysis
- Automatic sales forecasting

Accounts Payable
- Check printing with multiple invoices and cash available routines
- Aging reports with seven customized columns
- Unlimited number of vendors
- Flexible mailing labels and directories
- Three year vendor history
- Unlimited allocations per invoice

Inventory
- Supports average, last purchase, and standard costing methods
- Powerful physical inventory routines
- Accepts any unit of measure
- Three-year product history in units, dollars, cost, and profits
- Automatic forecast of product sales
- Automatic pricing assignments
- Alert and activity reports with 11 sorts
- CRT shows on-hand/on-order/committed/sales/cost/profit/turns/GROI

Purchase Order
- Inventory and non-inventory items
- Allows up to 99 lines per P.O.
- Per line discount in %
- P.O. accepts generic discounts/freight/taxes/insurance
- P.O. accepts back orders and returns
- Purchase journal

Billing
- Service or Inventory invoicing on plain or preprinted forms with remarks
- Prints sales journal
- Allows return credit memo

Forecasting
Unique program that automatically forecasts using your three-year history
- Revenue and expense accounts
- Vendor purchases
- Customer sales, cost, and profit
- Inventory item usage
- Forecast by same as last year or % base from last year, or trend, or least square trend line analysis method

"EDITOR'S CHOICE"
PC MAGAZINE

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Bill Machrone, Editor
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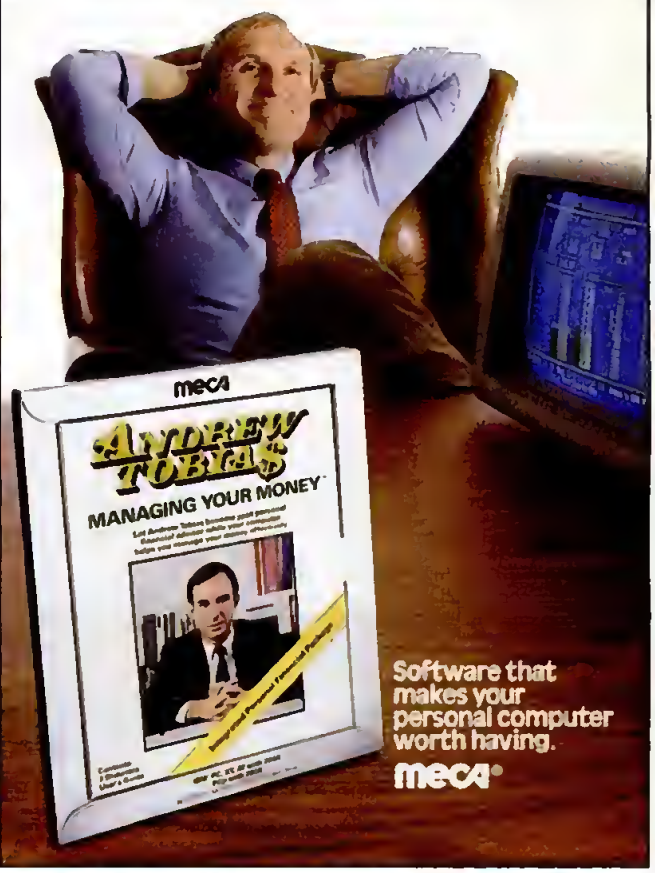
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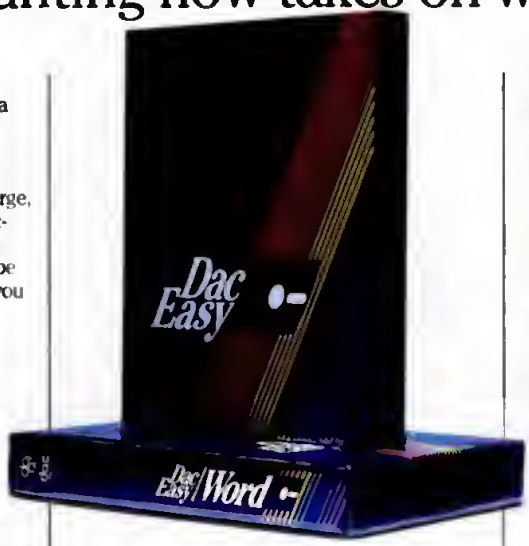
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Automatic Word Search

Dac-Easy quickly locates all mentions of a particular word, phrase or number using any of three user-defined methods of searching. Automatically replace the word, phrase or number throughout the text with the global replace feature, or highlight each mention so you can decide where you want it changed or replaced. Scan in *either* direction.

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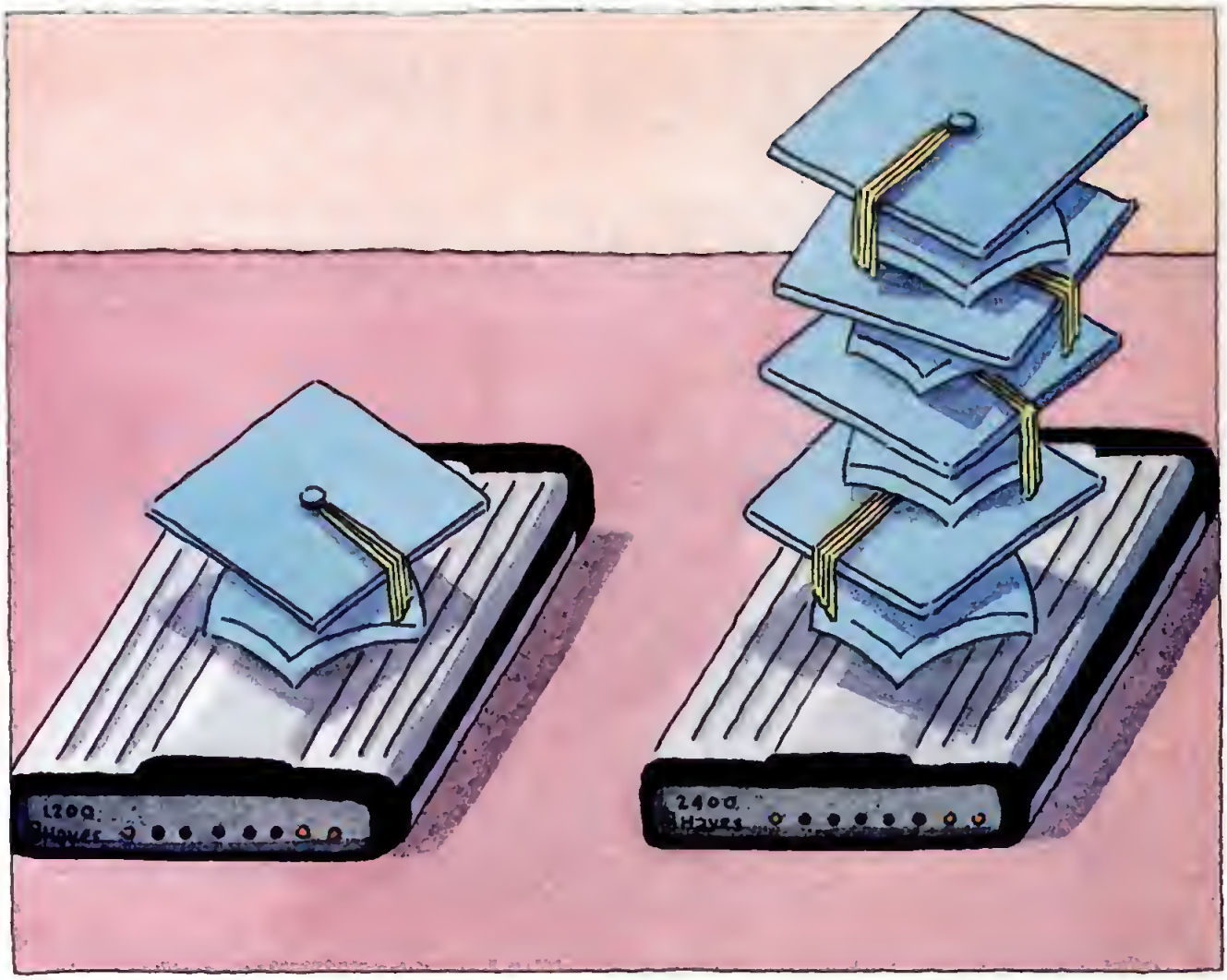
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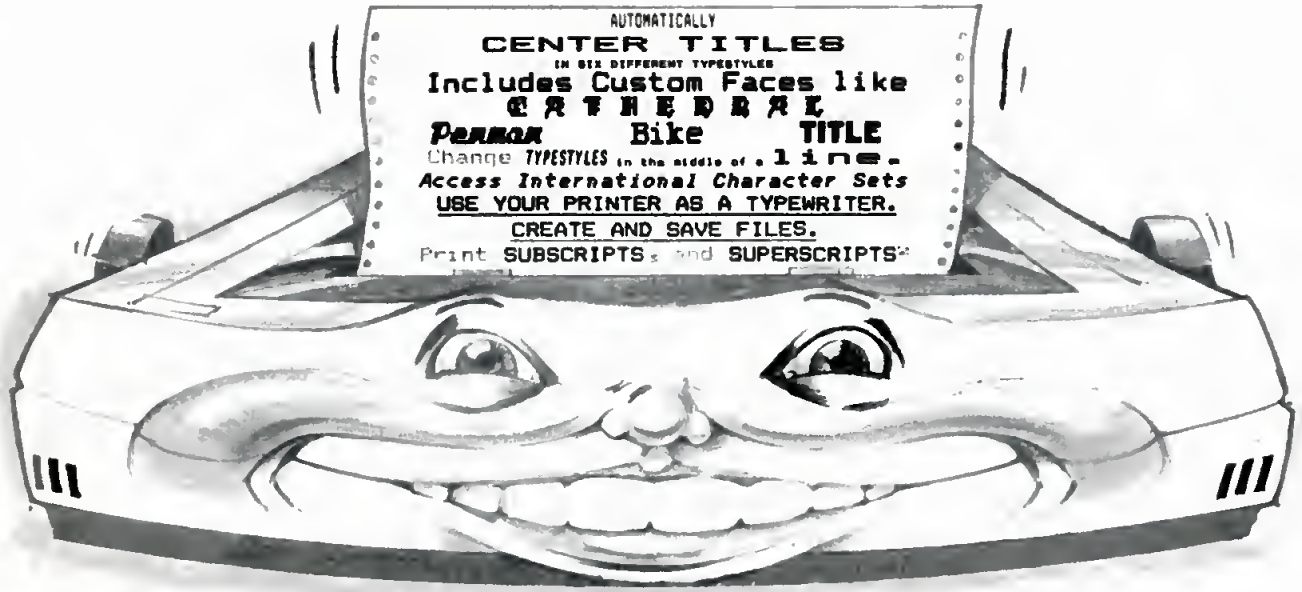
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NETWORK NEWS

Vol. 1, No. 4 *A GUIDE TO THE PROMISED LAN®* *Dec. 10, 1985*

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PROLAN Pessive Hub 4 $100
Connect up to four PC's together using one PROLAN Hub 4. Or use the Huh 4 in combination with the Hub 8 for larger systems. See Network News, Vol. 1, No. 3 for more information on PROLAN network design.

PROLAN DeteDrive (10-40 MB) $1395 up
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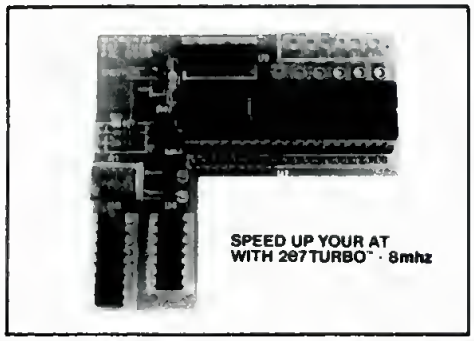
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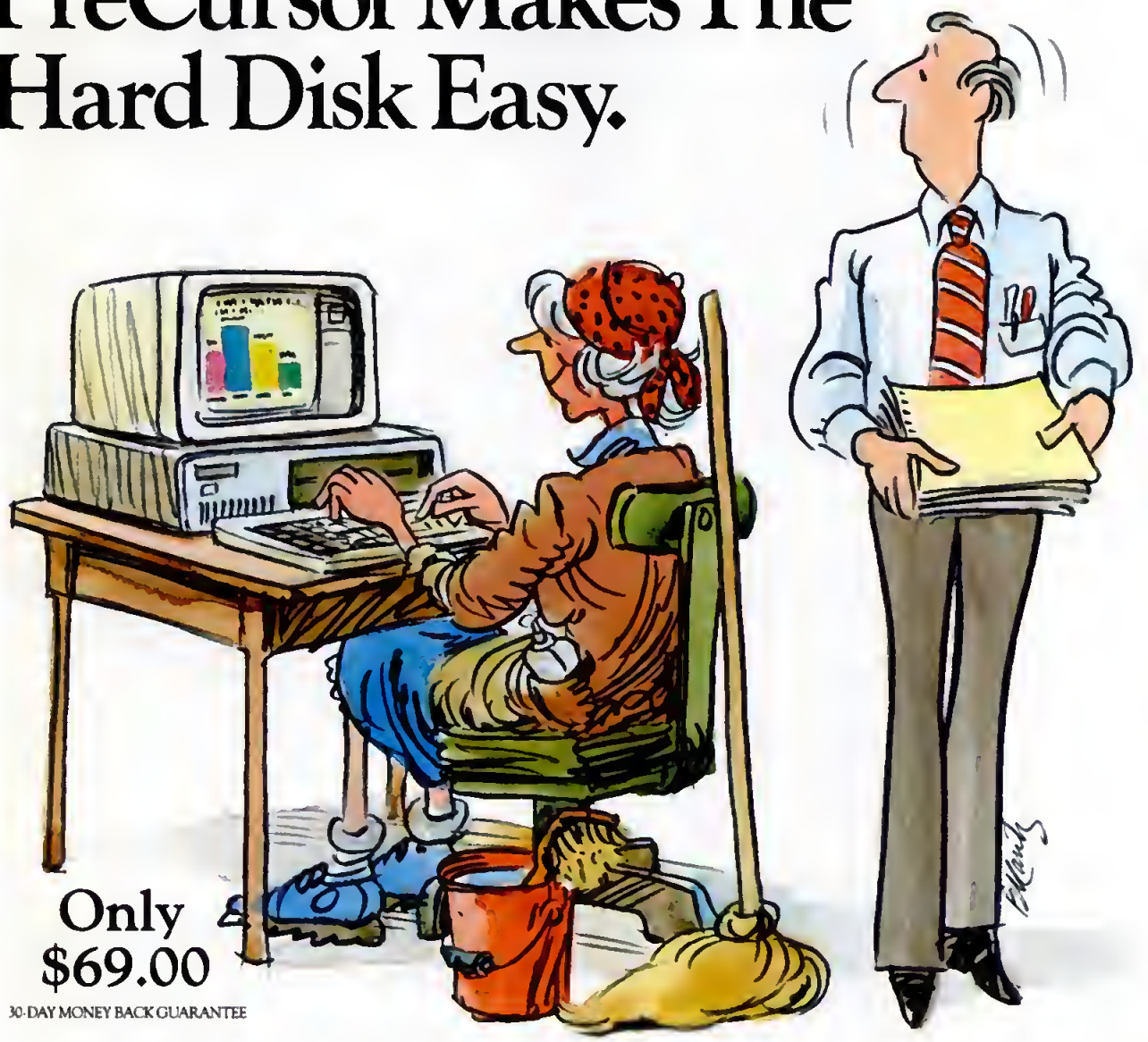
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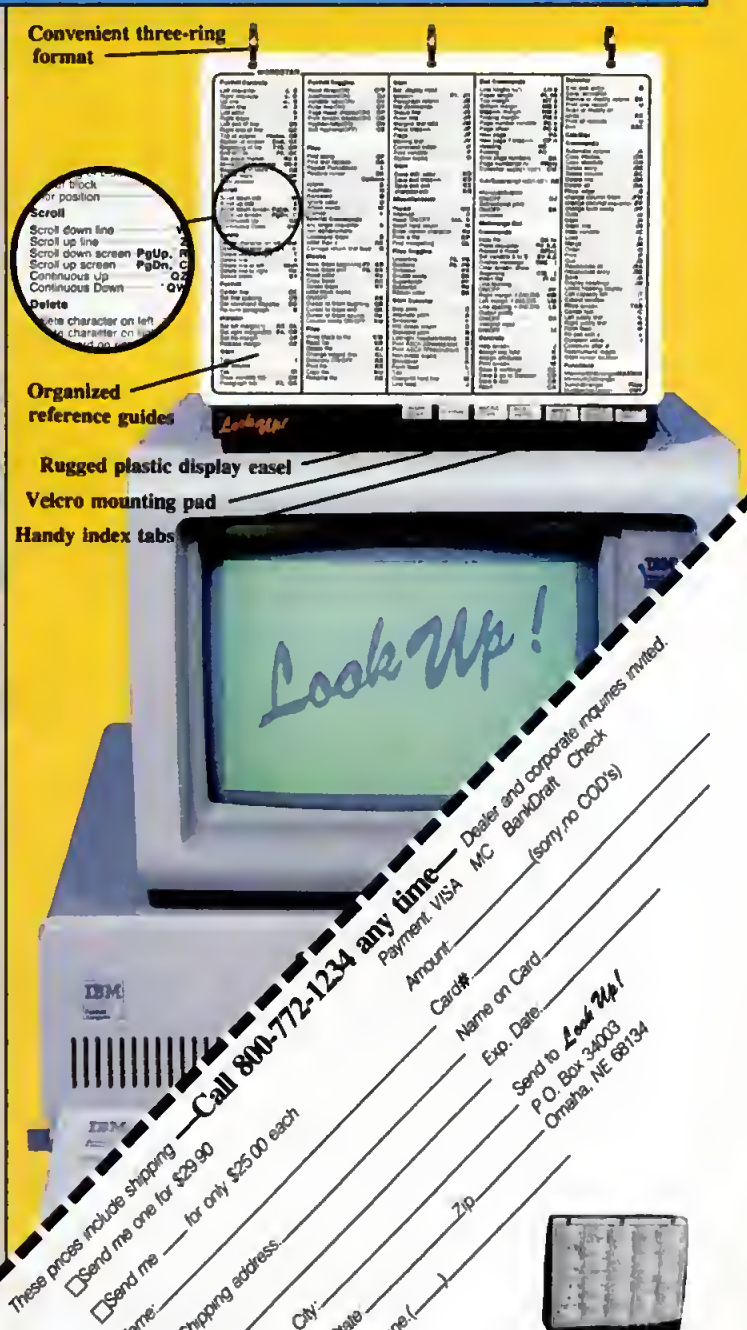
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A lot of people have been saying a lot of good things about WordPerfect, lately. In fact, our 4.0 version has been called the industry standard for word processing.

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The latest result of that commitment is WordPerfect 4.1. And with several new features, it scores more than a few extra points.

1. Thesaurus

With a built-in thesaurus, WordPerfect 4.1 lets you choose synonyms for any words in your document.

2. Split Screen

By splitting the screen horizontally, you can view two documents at the same time. And editing either document or moving text between the two windows is fast and easy.

3. Text Columns

Columns are displayed side-by-side on the screen. In addition to newspaper-style columns, WordPerfect 4.1 includes parallel columns, ideal for scripts.

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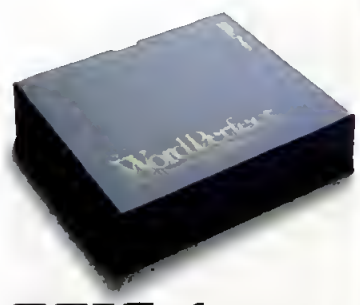
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PC News

NEW IBM/ROLM PRODUCTS 35
PC ADVISOR 43
COMMUNIQUÉS 46
DOWNTIME 58

IBM Unveils Its New Token-Ring Network

Hot Token-Ring Network is introduced along with a series of cabling-system options and network-applications software.

BY BILL MACHRONE



IBM's Token-Ring Network, shown above as 8-station unit on wall, lets users share files, applications, and printers. Adapter card and disk, $695; access unit, $660.

NEW YORK—It was years in the making, accompanied by lots of noise, and took place at very high corporate levels. But the similarity to elephants ends there.

IBM's new token-ring network hardware is finally here. It's fast, flexible, and chock full of technical innovations, although there are still some serious software gaps. IBM claims this new product runs at 4 megabits per second over ordinary telephone-type, twisted-pair cable. The adapter's price is steep at $690, but chances are you already own the wires that you'll use to interconnect machines.

IBM offers two compatibility paths to software vendors. The first is through NETBIOS (the same software used on IBM's PC Network adapter), which is fully compatible with DOS 3.1. The second is through ACCP, the network-interface scheme used by just about every other product in IBM's inventory. Unlike the existing PC Network adapter, the new board does not include NETBIOS as a ROM chip; it must be loaded from disk as a device driver when PC Network emulation is required.

Deft Adapter

NETBIOS will permit applications written for DOS and existing PC-networking schemes to work on the token ring, while the ACCP interface serves as an

(continued on next page)

AT&T's 6300 Plus Packs In Power

New AT compatible has the agility to run DOS and UNIX simultaneously.

BY BILL MACHRONE

NEW YORK—AT&T has upgraded its family of MS-DOS computers in a big way, making them more powerful and packing them with more features. Most notably, the PC 6300 has gained a new sibling, the PC 6300 Plus. It joins the AT class of machines and adds a $395 software package that allows it to run DOS and UNIX programs simultaneously (see chart on next page). The 6300 Plus is available now as a super-DOS machine, and its UNIX capabilities will be available in the first quarter of 1986.

AT&T's 6300 Plus is PC AT compatible and then some. It's a fast, flexible machine, with the same footprint as the 6300. Inside lurks an 80286 chip running at 6 MHz with no wait states. On the whole, it runs about 20 percent faster than IBM's AT, but not quite as fast as COMPAQ's 8-MHz Deskpro 286. And, at $5,095 for the basic system ($6,320 with a 20-megabyte hard disk), the 6300 Plus is AT price-compatible as well.

But the new 6300 Plus has a major problem—its name. It

(continued on next page)



AT&T's $5,095 PC 6300 Plus comes with a 1.2-megabyte floppy drive, four 8-bit expansion slots, three 16-bit AT compatible slots, and a monitor

Token-Ring

(continued from preceding page)

entry point for applications written for IBM's minicomputers. Without trying to read too far between the lines, this announcement would appear to presage an operating environment other than DOS.

ACCP is also strategically important because it's the accepted way of hooking into SNA (System Network Architecture or System for Negating Alternatives, depending on whom you talk to). In any event, ACCP/PC won't be available until the second quarter of 1986. You can bet there'll be some important software announcements in the meantime.

The token-ring adapter is a technological tour de force. It fits into a single XT or AT slot and, according to IBM, draws little enough power to not trouble the PC's power supply. It sports no fewer than five custom LSI chips, including a microprocessor, receive and transmit protocol handlers, and a general logic chip.

The network's 4-megabit speed makes it the current champ of the twisted-pair marketplace. At twice the speed of the broadband PC Network and at a comparable price, the token ring is a smarter buy.

About the only PC-oriented product that outspeeds the token ring is the 10-megabit-per-second Ethernet. Everything else takes a back seat, although line speed is far from the sole determinant of a network's performance. It remains to be seen whether the newcomer can live up to its potential in actual tests.

What's a Token?

A token ring, which has no central controller, operates by giving each station permission in turn to transmit information. Each station knows when its turn has come and when to pass on the token. The system operates fast enough so that users are not conscious of the wait. A token-ring network is not inherently superior to the more conventional CSMA (Carrier-Sense Multiple Access) techniques used by most networks for the PC. IBM, however, has had a longstanding attraction to it, and has big plans for interconnecting everything in sight.

In addition to SNA, the new network allows one or more PCs to act as an asynchronous gateway through a PBX to external dial-up services. IBM will also make available a LAN-to-LAN bridge program, which needs a dedicated PC on each network. Furthermore, a Series/1 gateway allows the PCs on the network to use the Series/1 as a disk and print server as well as a communications link to a System/370 mainframe. ■

AT&T's 6300 Plus

(continued from preceding page)

shares this problem with AT&T's non-PC-compatible UNIX PC, formerly called the 7300. The name "UNIX PC" was a surprise to everyone at the machine's introduction, including Microsoft president Bill Gates, who, like everyone else, kept calling it the 7300. AT&T doesn't seem to understand that the term *PC* no longer simply means "personal computer." It connotes an IBM PC or a compatible computer. The UNIX qualifier just confuses things.

The 6300 Plus (which was called the 8300 by the company during development) is the "real" UNIX PC. It's a true PC compatible that comes with an extra: Built-in hardware and clever software design let it run MS-DOS as a subtask under a full System V UNIX operating system. Better still, it can handle both systems concurrently. UNIX remains a multitasking operating system, although this machine is not intended for multiuser applications. Since DOS and UNIX share a common file structure, they can pass files back and forth with utter transparency.

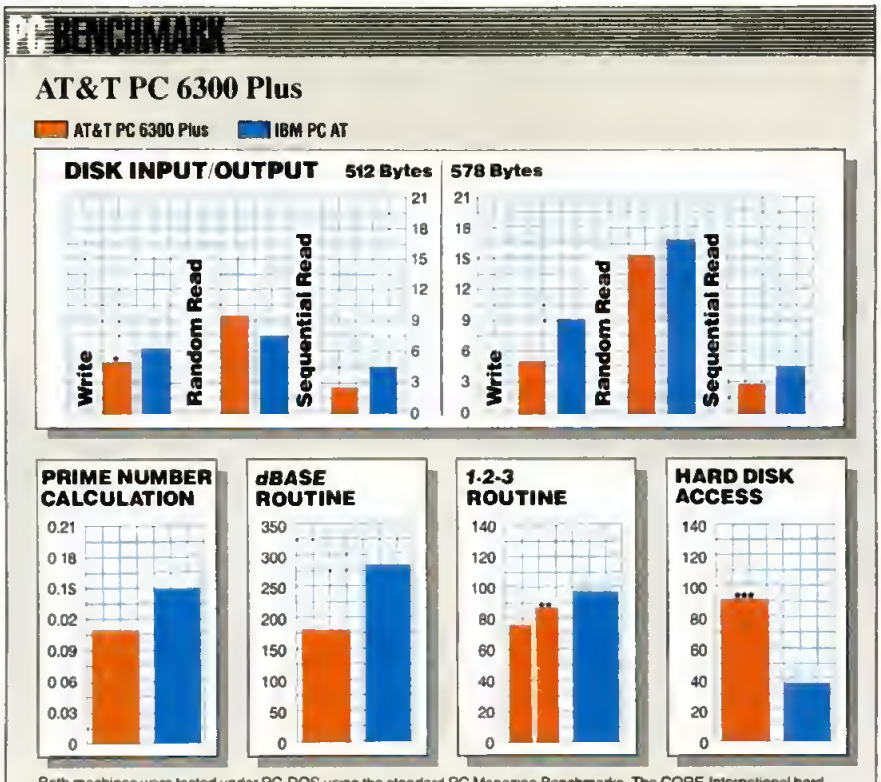
Best of all, if you type a DOS command from UNIX, the system figures out that it needs to swap DOS back in to run the command. So you can type 123 from UNIX's classically unhelpful dollar-sign prompt, and moments later, you will be running a spreadsheet. At the touch of a "hot" key, you can be back in UNIX to run an editor, or whatever you want. With another press on the hot key, you're back in *1-2-3*.

The bad news is that you'll have to wait for UNIX. The version we tested was fully operational but had a crude window-oriented shell program to insulate the user from UNIX. It worked fine, but it wasn't especially fast.

AT&T's district manager of product management and development, John Leikness, promises a fully developed UNIX windowing system by the time UNIX is made available for the machine.

No Holes Barred

AT&T seems to have thought of everything on this machine. The 6300 Plus comes with a 1.2-megabyte floppy drive and is expandable to 1 megabyte on the motherboard. It has four 8-bit expansion slots and three AT-compatible 16-bit slots. Filling these slots with 2-



In eight out of nine Benchmark tests the AT&T PC 6300 Plus ran faster than IBM's PC AT despite the inherent slow speed of the 6300's hard disk, as shown in the CORE International hard disk access test above.

IBM Picks LED Technology For New High-End Printer

BY JOHN DICKINSON

IBM has finally entered the high-end PC printer arena with its long-awaited Pageprinter, based on LED (light emitting diode) array technology.

The new $7,490 printer is capable of speeds up to 12 pages per minute and offers 62 fonts and all-points-addressable (APA) graphics. LED array printers are similar to laser printers in that they borrow their ink-transfer technology from the copier industry, but differ because a fixed array of LEDs instead of a laser sensitize the toner drum.

The high speed of the new printer is impressive, but its image resolution is not. It does both graphics and font imaging at 240 dots per inch (dpi) instead of the 300 dpi most laser printers are capable of. As a result, Pageprinter text and graphics look more like the work of a typical matrix printer than of a modern laser printer.

IBM also announced a new $699 version of the Wheelprinter. It is rated at 16 characters per second (cps) but has the same features of the more expensive 25-cps model. It is available immediately.

The new Pageprinter is designed for a variety of environments. It can be attached to a PC, shared by up to eight PCs using an optional attachment card, attached to an IBM PC Network or Token-Ring Network, or it can be attached to a System/36 or VM computer.

The Pageprinter is equipped with two paper bins, one of which holds up to 550 sheets and the other, 250. Paper size can vary from 7 by 10 inches to 8.5 by 14 inches, and bin selection can be made manually or by software control from the host computer. Output is stacked with the first page on top.

Pageprinter type fonts are stored on a floppy disk inside the printer. The machine defaults to standard IBM Proprinter fonts when it starts up, but other fonts can be loaded by software on the host computer. A Pageprinter driver program is supplied for DOS and other IBM systems. It has a selection menu that enables the user to easily change fonts.



IBM's new Pageprinter LED array printer can print up to 12 pages per minute.

IBM has already upgraded *DisplayWrite 3* to take advantage of the Pageprinter's capabilities. An official at Microsoft indicated that Version 2.01 of *Microsoft Word* is being shipped with printer support for IBM's new printer.

The Pageprinter will be available in February. ■

megabyte boards brings the system's total memory to 7 megabytes.

The 6300 Plus is sufficiently hardware compatible to run the standard PC Magazine Labs hard-disk performance benchmarks. The AT&T reserves a small area of the hard disk that is off-limits to UNIX, specifically for copy-protected DOS programs to put their hidden files, scrambled sectors, and other garbage.

The memory management scheme uses the 80286's protected mode to run UNIX and the "real" mode to run MS-DOS. AT&T's additional hardware makes it virtually impossible to crash UNIX from DOS, even while changing bytes in DEBUG. Such protection is essential if AT&T is to guarantee the ability to run background UNIX operations.

UNIX has hidden talents, many of which are useful to the advanced PC user or the company trying to build a network of PCs and larger machines. It is especially strong in inter-machine communications, and its file system is a natural for networking.

UNIX's group and individual read/write permissions are perfectly suited for networking—far better than those of MS-DOS. Because DOS and UNIX share the UNIX file structure, it's safe to assume that this machine will have a big role in AT&T's networking plans. ■

PC Speech Synthesis and Juniper II Extend IBM Line

BY VIRGINIA DUDEK

NEW YORK—Among the products announced in IBM's October sweep were two that turn the PC into a telephone station with answering-machine functions and the ability to receive textual and synthesized speech messages.

Also announced by ROLM Corp., an IBM subsidiary, were Juniper II, an integrated voice/data communication system for ROLM's CBX users; and the ROLM 3270 CTPA (coaxial-to-twisted-pair adapter), which connects IBM 3270-type terminals to control units or multiplexers with twisted-pair wiring.



ROLM's Juniper II, with adapter card, cable, and software, connects the PC, XT, or AT to a ROLM CBX. It retails for $1,295.

The PC Finds a Voice

The IBM PC Voice Communications Option, available now for $1,250, adds voice and telephone management to the PC, XT, or AT. It includes a multifunction adapter card and control program. The card and software will be available separately for $1,200 and $65, respectively, early next year.

When installed, the adapter card allows the computer to recognize voice commands, synthesize a human voice to convert text into speech, record and play back voice input, monitor a phone line, and do telephone management. It also includes an internal Bell 103/212A standard modem. Six other programs are available for $70–$250.

The Personal Telephone Manager, available now, consists of a $325 adapter card and a $70 applications program that can connect a telephone to a PC and can concurrently run automatic phone-management functions while another PC applications program is on-screen.

The biggest surprise in this offering was the abysmal quality of the synthetic speech. It's hard to imagine the IBM logo on this product, especially in light of Digital Equipment Corp.'s Dectalk synthesizer.

New from ROLM

ROLM's $1,295 Juniper II consists of a digital ROLMphone unit with a built-in speaker, a standard-size adapter card, a cable to connect phone and computer, and software that allows PC, XT, and AT users to transfer information between IBM host computers or other PCs at speeds of up to 9600 baud. The PC connects to the ROLM CBX wiring system via the ROLMphone. ■

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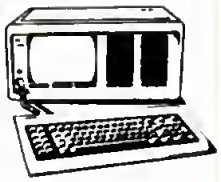
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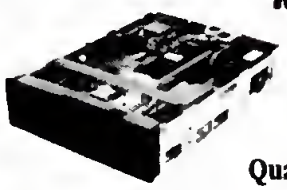
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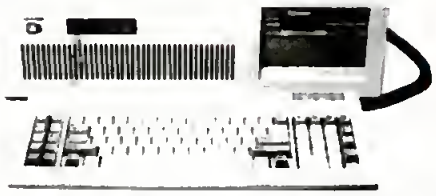
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AST Plans Fast Network; EGA and Turbo Cards Due

BY BILL HOWARD

IRVINE, Calif.—AST Research Inc. touched bases with all segments of the PC community with fall announcements of more than a half-dozen new products, including a network, a 70-megabyte hard disk and 60-megabyte tape backup, a data security manager and DOS shell, memory cards bundled with a *Desqview* window manager, a PC "turbo" speed-up card, a three-in-one EGA, CGA, and Hercules-compatible monitor adapter, enhanced PC-to-System 34/36/38 links, and the promise of a laser printer to outdo Apple's LaserWriter.

The new products, according to AST executive vice president Thomas C.K. Yuen, recognize users' needs for faster PCs, more flexible memory, and secure sharing of files and messages on a network that won't be obsolete in a few years.

The AST Resource Sharing Network supports IBM's NETBIOS (Network Basic Input/Output System) and AST's lookalike AST-NETBIOS on a baseband network for up to 64 users 1,500 feet apart. Anything from a PC-XT to AST's new 70-megabyte Colossus hard disk can drive the system. Data moves at 5 megabits per second over coaxial cable, 25 percent faster than IBM's new token-ring network.

NETBIOS Standard

AST believes NETBIOS is the standard the PC community has been waiting for, although the standard turned out to be based around software rather than a hardware-oriented protocol such as Ethernet.

To run the network, users need network adapters, $495 per PC; the AST-NETBIOS option, which is $195; and the AST Resource Sharing Program, which, like IBM's network program, is $75.

For expanded storage, AST introduced the Colossus 70-megabyte external hard disk and 60-megabyte tape backup. At $7,499 with a PC interface card that allows direct booting, Colossus isn't for the budget conscious. Instead, it offers the advanced SCSI interface, the ability to connect five Colossus drives for more than 350-megabytes total storage, and a 30-millisecond disk access time.

Data Security

The Knight Data Security Manager ($295 for a single user, $395 for a network) combines an easy-to-use DOS shell; electronic mail; password protection; system audits; data encryption; data space separation, so two users sharing a word processing directory see only their own files; and Chaperone, a program for "locking" a file onto the hard disk so only the system manager can copy it onto a floppy disk.

AST plans an as-yet-unnamed, under-$500 video adapter that emulates IBM's $549 Enhanced Graphics Adapter, IBM's Color/Graphics Adapter, and the Hercules monochrome card.

AST also plans an under-$500 8086-based turbo card to give existing PCs and PC-XTs some of the speed of an AT without the expense. The card will work with expanded memory cards such as AST's RAMpage! or Intel's Above Board.

AST's RAMpage! and RAMpage! AT memory cards that expand a PC's directly addressable memory to 2 megabytes will include the $99.95 Quarterdeck *Desqview* windowing/concurrent processing program, which is similar to the better-known IBM *Top View* and *Microsoft Windows*. According to Yuen, AST doesn't expect "a significant multitasking DOS in the next 12 to 18 months" and believes *Desqview* has the flexibility to be an interim operating shell while IBM and Microsoft sort out the future of DOS.

RAMpage! for the PC and PC-XT is $495 for the 256K-byte version; RAMpage! AT for the PC AT will be about $700 with 512K bytes of RAM.

Laser Printer Planned

AST plans to enter the laser printer business with a 12-page-per-minute, 300-dot-per-inch unit supporting the Hewlett-Packard Graphics language. AST claims it will offer better quality than the Apple LaserWriter or the IBM 9000 at a price between the Hewlett-Packard Laserjet and LaserWriter.

Finally, AST announced the AST 5251/11 Plus, an improved version of the system that connects up to four PCs or VT-100 terminals to IBM's System 34, 36, and 38 minicomputers, with a toggle to flip between DOS and the minicomputer. The Plus version supports up to seven concurrent sessions. ■

Tandy Corp's 600 Bridges The Laptop-Desktop Gap

BY BARBARA KRASNOFF

FORT WORTH, Texas—Tandy Corporation has come out with an addition to its line of computers: the Tandy 600 computer, an 11-pound, $1,599 full-featured laptop designed to bridge the gap between useful but limited "briefcase" machines and full-fledged desktops.

The 600's stubborn individuality makes it different from most laptops on the market today.

What's Inside

On the hardware side, Tandy has put 32K bytes of RAM into the 600, expandable to 128K bytes or 224K bytes with a 96K-byte RAM upgrade kit; a 16-bit 80C88 microprocessor; a 300-baud modem; an 80-character by 16-line LCD display screen; a built-in clock; and a 3½-inch 360K-byte floppy disk drive for data storage.

External links include a standard RS-232C connector, an expansion bus for Tandy's standard external floppy disk drive; a parallel printer port, a phone port for the modem, and an AC hookup.



The Tandy 600 measures 12½ by 11½ by 2½ inches and has a surprisingly clear 16-line flip-up screen.

Five-in-One

Incompatible with any other machine (though it can export and import ASCII files), the computer contains five full-featured applications programs built into memory: *Microsoft Word*, *Multiplan*, Telcom, File, and Calendar. They are part of an integrated program by Microsoft called *Works* which was specifically put together for use on portable machines; only the first two programs are available as standalones. Telcom, File, and Calendar are full-featured, menu-driven programs like *Word* and *Multiplan*—not the simplified packages supplied with Tandy's smaller portables.

All in all, the Tandy 600 is a promising entry into the race for the perfect laptop microcomputer. Unlike some of the new machines that need so many peripherals to operate that they resemble a mechanical octopus, the 600 seems to have been very well planned for the traveling user. However, whether the computer's portability and price will make the difference in a marketplace deluged with PC-compatible laptops remains an open question. ■

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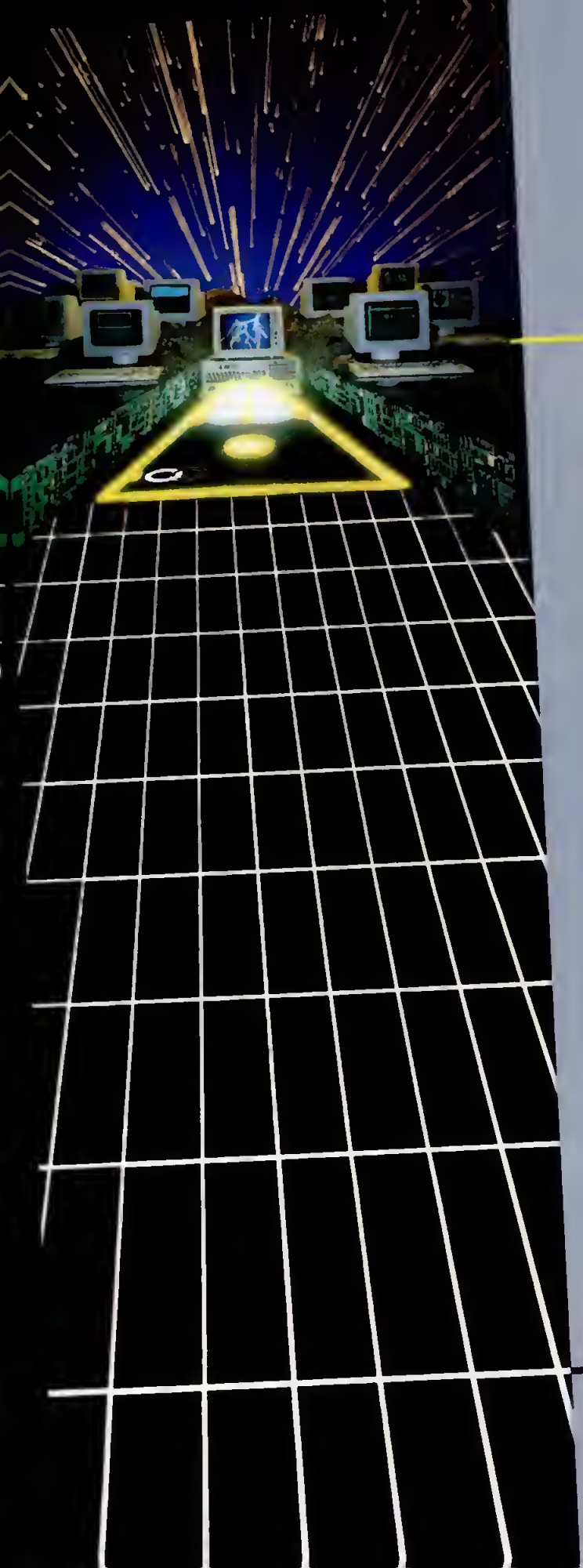
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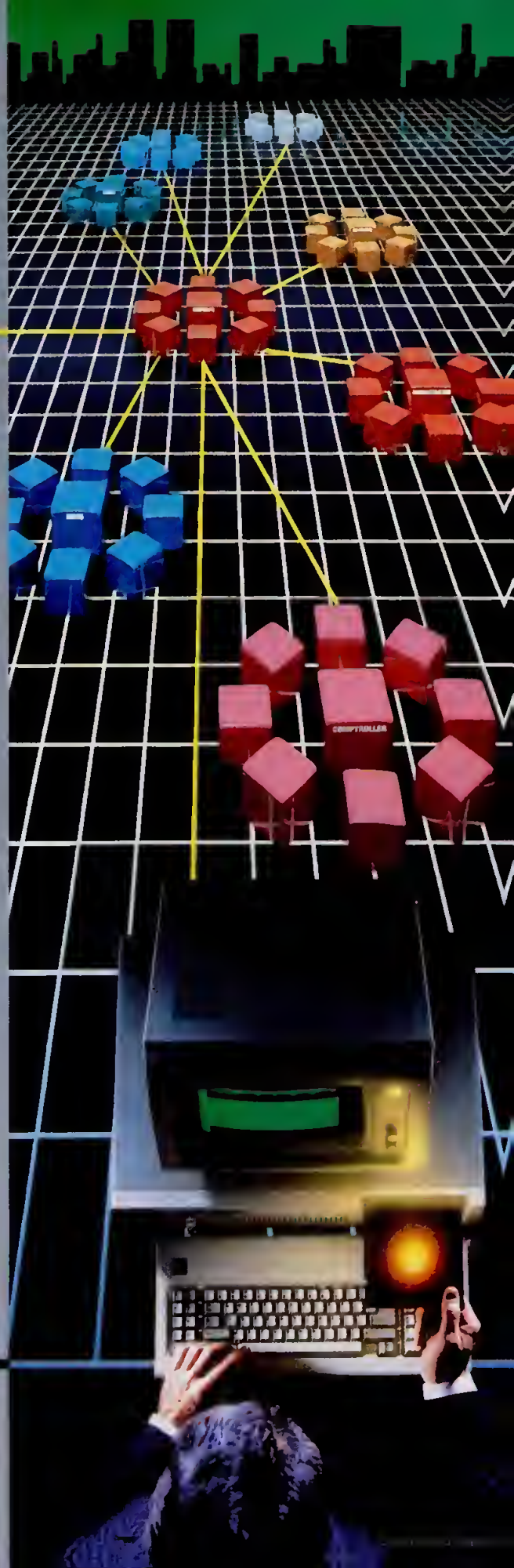
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1-2-3 Report Writer: Strictly Supplemental

PRODUCT REVIEW

BY GUS VENDITTO

1-2-3 Report Writer
Lotus Development Corp.
55 Cambridge Pkwy.
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List Price: $150
Requires: *1-2-3* or *Symphony*.

If you've ever found yourself wishing you could put some finishing touches on a spreadsheet before printing it, you might find salvation in *1-2-3 Report Writer*—Lotus Development Corp.'s new companion to *1-2-3* and *Symphony*. On the other hand, if what you really want is to whip your spreadsheet into shape by running it through a word processor, you're likely to be disappointed with the powers of this new, copy-protected program.

Rumors persist in the industry that Lotus is developing its own word processing program, which is bound to offer a more convenient interface than the cumbersome procedures that you now have to follow when going from spreadsheet to text editor. For the present, however, *1-2-3 Report Writer* is not the flexible tool for transforming spreadsheets into reports that I hoped it would be.

To be sure, *Report Writer* is easy to learn and use. It follows Lotus's comfortable slash (/) command structure and almost guarantees that you'll produce concise, coherent tabular material. Although you must massage your data fields without seeing the changes reflected on screen, it's easy enough (if a trifle slow) to call up the result before it prints.



1-2-3 Report Writer's easy-to-use slash (/) command structure helps you organize your fields and add italic or boldface to selected columns.

The Long Way Around

Report Writer accepts only *1-2-3* .WKS files as input; only column headings can be edited. This can be annoying when you realize, as you're working on your report, that some of the changes you need to make mean exiting *Report Writer*, booting up *1-2-3*, changing and saving the spreadsheet, and then returning to *Report Writer* to finish the job. You can add headings and footnotes, but only five lines worth.

Where *Report Writer* really shines is in completing preprinted forms (assuming your printer accepts single-sheet input) and mailing labels. Its ability to take your spreadsheet lists and put them into label formats of virtually any size is a feature that may have you smiling all the way to the Post Office.

I guess if Lotus had called this program *1-2-3* "Form Filler" I'd have said it was a nearly perfect product. But as a report writer, it's strictly for supplemental material. ■

PC ADVISOR EDITED BY GUS VENDITTO

PC Advisor is a regular feature that helps readers choose the best hardware and software to improve their productivity.

Facing the PC's Speed Limit

Can I install an 8088-2 in my IBM PC to increase the clock rate? If so, which crystal can I use, and will my PC run faster?

Robert Wyman
Darien, Connecticut

No, you can't. The crystal, which sets the IBM PC's clock rate at 4.77 MHz, is soldered in place—not socketed—so you wouldn't be able to get it out without causing serious damage.

The correct way to increase the PC's calculation speed is with an accelerator board. There are a number on the market but, for simply stepping on the gas pedal, we recommend the Quadsprint (Quadram, Norcross, GA 30093; (404) 923-6666; List Price, $645) or the PC Superflight 256 (Kamerman Labs, Beaverton, OR 97005; (508) 626-6877; List Price, $699).

Installing these baards is slightly more involved than adding an expansion card because you have to remove the 8086 microprocessor from the PC's motherboard and replace it with a cable running to the accelerator card. No installation software is required. Both will raise the clock speed to 10 MHz.

The PC Superflight 256 offers some additional memory (128K bytes or 512K bytes for an extra $200), but because the extra memory is processed in 16-bit units (instead of the 8 bits used by your PC's system), you have to dedicate this memory for separate processing every time you use it. For this reason, the Quadsprint board is the simplest way to increase calc speed that we know of.

When Your Writing Needs A Table and Feet

I'm a college professor and am often writing long theses. Which word processing software has the best footnoting and indexing capabilities?

Mark Petracca
Irvine, California

You may have seen some of PC Magazine*'s writers refer to* XyWrite II. Plus *(XyQuest Inc., Bedford, MA 01730; (617) 275-4439; List Price, $295) as the word processor used here at the magazine. One of the reasons we use it is that it offers many features useful to a professional writer: indexing and footnoting are downright easy with* XyWrite. *Occasional users may find* XyWrite's *command-driven structure difficult to master because menus are not used.*

A bit more expensive, but far easier to learn, is WordPerfect 4.0 *(Satellite Software International, Orem, UT 84057; (801) 224-4000; List Price, $495). It's a powerful program that has a very well designed command structure. It compiles indexes, adds footnotes, and can format text as elaborately as you want.*

Users of WordStar *can add indexing and footnoting capabilities with auxiliary programs from Digital Marketing (Walnut Creek, CA 94595; (415) 947-1000). You can buy separate indexing or footnoting programs for $75 each or buy the* Writer's Pack *which includes both, plus a spelling and grammar checker for $250.*

MicroPro also sells an indexing option, Starindex, *as part of a* WordStar *upgrade package that includes* MailMerge *and a spelling checker; it's $140. To order call (800) 227-5609.* ■

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KB 5153 Keyboard w/Touch Tab	$ 400	$ 325
KOALA, Koala Pad w/PC Design	$ 150	$ 85
MAYNARD, SANO STAR SERIES		
Multifunction (6) Card	$ 89	$ 79
Memory Card no RAM	$ 199	$ 139
Floppy Cont. Card (accepts 3 modules)	$ 265	$ 195
Serial Port Module	$ 95	$ 79
MICROSOFT, Mouse (for PC)	$ 195	$ 129
Serial Mouse	$ 195	$ 145
MOUSE SYSTEMS, PC Mouse & Paint	$ 220	$ 145
PARADISE, Modular Graphics Card	$ 395	$ 279
256K Module w/clock	$ 199	$ 150
PERSYST, PC/Color Graphics Board	$ 244	$ 179
PC/Mono Board w/parallel port	$ 250	$ 159
QUADRAM, Quadboard, no RAM, to 384K	$ 295	$ 195
Quadboard 64K, to 384K, S/P/CC/G	$ 395	$ 239
Quad 512 + 64K w/serial port	$ 325	$ 245
Quadcolor I, board, 4 colors	$ 295	$ 175
Quadlink	$ 495	$ 375
Quadsprint	$ 645	$ 495
TALLTREE, J RAM 6 Board	$ 215	$ 159
TITAN, 128K PC Accelerator	$ 795	$ 595
WICO, Smartboard Keyboard	$ 400	$ 279

ACCESSORIES

CURTIS, Diamond, 6 outlets, switched	$ 50	$ 29
Emerald , 9 outlets, 6' cord	$ 80	$ 35
Ruby, 9 outlets, 6' cord, filter	$ 90	$ 55
Sapphire, 3 outlets, w/filter	$ 80	$ 46
Command Center	$ 190	$ 115
NETWORX, Wiretree 4 outlet, w/filt & surge	$ 70	$ 39
Wiretree Plus, 6 outlets/filter/surge	$ 100	$ 59
PROD TECH INT'L, Uninterruptable Power Supply		
200 Watts, PC200 for IBM-PC	$ 359	$ 289
300 Watts, XT300 for IBM-XT	$ 499	$ 399

PRINTERS

DOT MATRIX:

	LIST	CONROY
EPSON, FX 85 — 160 cps DQ, 32 cps NLQ	$ 499	$ 389
FX 185 — 160 cps DQ, 32 cps NLQ/15"	$ 699	$ 539
LX 90 — 100 cps DQ, 16 cps NLQ/Tractor	$ 329	$ 259
LQ 1500 — 200 cps DQ, 67 cps LQ	$1295	$ 995
HEWLETT-PACKARD, Printers & Plotters		CALL
OKIDATA, Okimate 20 — Color, Hi Res	$ 268	CALL
182 — 120 cps/80 col	$ 299	CALL
182 — 160 cps/80 col/para.	$ 499	CALL
193 — 160 cps/132 col	$ 699	CALL
93 — 180 cps/136 col/para	$ 799	CALL
PANASONIC, P1090 — 90 cps/10"	$ 349	$ 249
P1092 — 190 cps/10"	$ 599	$ 459
STAR MICRO, SG10 — 120 cps DQ/30 cps NLQ	$ 299	$ 249
SD10 — 190 cps DQ, 40 cps NLQ	$ 449	$ 379
SR15 — 200 cps DQ, 50 cps NLQ, 16K	$ 799	$ 679
TEXAS INSTRUMENTS, 855 — 150 cps	$ 995	$ 795
TOSHIBA, 351 — 288 cps	$1695	$1195

LETTER-QUALITY:

JUKI, 6300 — 40cps/para	$ 895	$ 699
$100 — 18 cps/para/3 pitch	$ 599	$ 409
PANASONIC, P3151 — 22 cps/15½"	$ 859	$ 425
TOSHIBA, Prop. spacing 9 hi-res graphics:		
1340 — 144 cps DQ 9 54 cps LQ	$ 799	$ 919

MODEMS

HAYES, 2400 External Modem	$ 899	$ 619
Smartmodem 1200B (IBM)	$ 549	$ 379
Smartcom II Software	$ 149	$ 107
Transet 1000 — 128K Comm. Buffer	$ 399	$ 309
PROMETHEUS, ProModem 1200B (IBM)	$ 399	$ 289

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MAXELL, 10 ea, DS/DD, MD2 (IBM)	$ 65	$ 21
VERBATIM, 10 ea, DS/DD, MD34 (IBM)	$ 75	$ 20
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MAXELL, 10 ea DS/HD (IBM-AT)	$ 75	$ 46
MEMOREX, 10 ea. DS/HD (IBM-AT)	$ 84	$ 49

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KEY TRONIC, KB5151 Jr. Keyboard	$ 256	$ 196
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KOALA, Touch Tablet for Jr	$ 125	$ 75
MICROSOFT, Booster 128K w/Mouse	$ 295	$ 195
MOUSE SYSTEMS, Mouse w/software	$ 195	$ 138
QUADRAM, Expansion Chassis	$ 895	$ 540
Memory Expansion Board 128K	$ 275	$ 215
RACORE, Expansion Chassis	$ 675	$ 449
128K Expansion Board	$ 275	$ 199
TECMAR, Jr. Captain	$ 395	$ 309

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BUSINESS

	LIST	CONROY
1, 2, 3 FORECAST, requires LOTUS 1-2-3	$ 75	$ 59
ANALYTICA, Reflex	$ 495	$ 335
ASHTON-TATE, Framework	$ 695	$ 379
dBase III	$ 695	$ 386
dBase II, (req. PC-DOS 9 128K)	$ 495	$ 286
BPI, General Accig. AR, AP, or PR, ea.	$ 595	$ 385
BRODERBUND, Printshop	$ 60	$ 35
Graphics Library	$ 35	$ 22
DATA TRANS., Fontrix	$ 155	$ 99
DOW JONES, Market Manager Plus	$ 249	$ 155
Market Analyzer	$ 349	$ 225
Spread Sheet Link	$ 249	$ 159
FOX 9 GELLER, Quickcode III	$ 295	$ 185
GNP, CPA+ requires Lotus 1-2-3	$ 695	$ 468
HARVARD, Total Project Manager	$ 495	$ 275
HUMAN EDGE, Mind Prober (PC or Jr.)	$ 90	$ 29
IBM, Topview	$ 395	$ 365
INFOCOM, Cornerstone	$ 495	$ 316
LIFETREE, Volkswriter Deluxe	$ 295	$ 159
LIVING VIDEOTEXT, Think Tank	$ 195	$ 109
LOTUS, 1-2-3	$ 495	$ 309
Symphony	$ 695	$ 449
MOBS, Knowledgeman	$ 500	$ 275
MECA, Managing Your Money (PC)	$ 199	$ 105

BUSINESS

	LIST	CONROY
MICROPRO, Easy *NEW*	$ 190	$ 99
WordStar (PC)	$ 350	$ 199
WordStar 2000 Plus (copiable)	$ 595	$ 295
WordStar Professional, 4 Pak	$ 495	$ 265
MICRORIM, R:Base Series 5000	$ 695	$ 385
Upgrade 4000 to 5000	$ 245	$ 135
R:Base 4000	$ 495	$ 259
R:Base Clout	$ 249	$ 133
Extended Report Writer	$ 150	$ 92
MICROSOFT, Multiplan (PC or Jr)	$ 195	$ 124
Chart or Project, each	$ 250	$ 159
Word	$ 375	$ 239
MULTIMATE, Multimate Ver. 3.3	$ 495	$ 229
PALADIN, FlashCalc	$ 129	$ 86
PEACHTREE, Back to Basics	$ 395	$ 239
Peach Pak (GL/AR/AP)	$ 395	$ 218
SAMNA, Word Plus	$ 695	$ 349
Word III	$ 550	$ 279
SATELLITE, WordPerfect (PC)	$ 495	$ 219
SOFTWARE PUBL. PFS Report	$ 125	$ 75
PFS Write File Graph Plan or Access, ea.	$ 140	$ 84
PFS Proof	$ 95	$ 57
WARNER, Desk Organizer (PC or Jr)	$ 99	$ 63
XANARO, Ability	$ 495	$ 319

UTILITIES

	LIST	CONROY
BORLAND, Sidekick (copiable)	$ 95	$ 45
Turbo Pascal or Super Keys, ea	$ 70	$ 36
Turbo Pascal w/8087 or BCD, ea.	$ 110	$ 66
Turbo Pascal w/8087 & BCD	$ 125	$ 66
Toolbox or Turbo Graphics, ea.	$ 58	$ 29
Turbo Tutor	$ 35	$ 19
CENTRAL POINT, Copy II PC	$ 40	$ 22
PC Tools	$ 40	$ 22
DIGITAL RES., Gem Draw	$ 150	$ 95
Gem Desktop	$ 50	$ 32
CP/M-86® (PC/XT)	$ 100	$ 64
DR LOGO-86 (CP/M-86)	$ 150	$ 99
FUNK SOFTWARE, Sideways	$ 60	$ 37
LIFEBOAT, Lattice C	$ 495	$ 279
MAGNUM, Fastrak™ RAM/Disk & spooler	$ 90	$ 39
MICROSOFT, Macro Assembler	$ 150	$ 99
BASIC Compiler or C Compiler, ea.	$ 395	$ 269
Business BASIC Compiler	$ 450	$ 295
COBOL Compiler	$ 700	$ 459
FORTRAN Compiler	$ 350	$ 229
PASCAL Compiler	$ 300	$ 159
MICROSTUF, Crosstalk XVI (PC or Jr)	$ 195	$ 110
NORTON, Utilities (14 prgms) v 3.0	$ 100	$ 66
ROSESOFT, Prokey	$ 130	$ 90

HOME & EDUCATIONAL

	LIST	CONROY
BPI, Personal Accounting	$ 99	$ 63
CONTINENTAL, Home Accountant (Jr)	$ 75	$ 45
Home Accountant Plus (PC)	$ 150	$ 90
MONOGRAM, Dollars & Sense w/forecast	$ 190	$ 100
SCARBOROUGH, MasterType (PC or Jr)	$ 40	$ 25
Your Personal Net Worth	$ 100	$ 63
SIMON & SCHUSTER, Typing Tutor III	$ 50	$ 33
SPRINGBOARD, Newsroom	$ 50	$ 37
UNISON, Print Master	$ 60	$ 38

RECREATIONAL

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Zork II or III, each	$ 45	$ 25
MICROPROSE, Strike Eagle	$ 35	$ 23
MICROSOFT, Flight Simulator (PC or Jr)	$ 60	$ 33
ORIGIN, Ultima III (PC or Jr)	$ 60	$ 39
SIERRA/ON-LINE, Ultima II (PC or Jr.)	$ 90	$ 43
SPECTRUM HOLOBYTE, Gato	$ 40	$ 25
SPINNAKER, President's Choice, Amazon		
Fahrenheit, Rendezvous, Dragon, each	$ 40	$ 25

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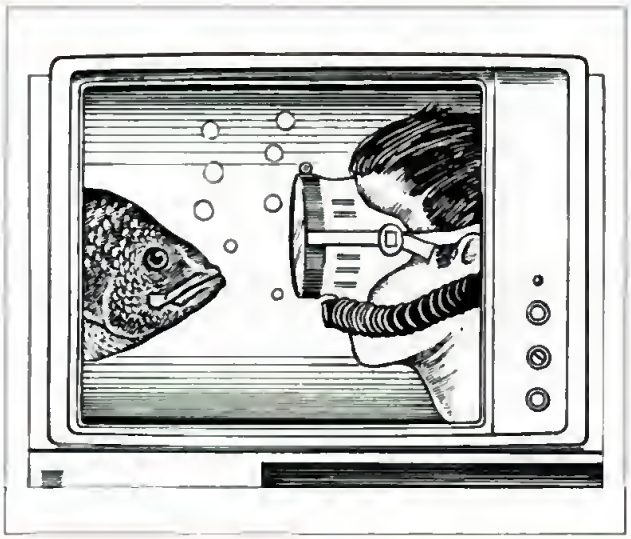
Single males of the 1980s take heart; your love lives are now just a modem connection away.

Romantic Encounters of Northridge, Calif., has cooked up The Dome, an on-line, computer-singles scene that guides users through simulated, romantic interludes. Responses are based on a personality profile.

Users play the singles-bar game in an appropriate simulated environment: a plush, exclusive high-tech club called The Dome. A first encounter helps determine what scenario a user might find enjoyable. "It's up to you to decide how to respond to a woman who doesn't exactly like the way you've approached her," advises the press kit. "Play it the right way and you might fall in love, with all the excitement and tenderness you can handle. Play it wrong and you might find yourself ignored, punched, or left standing around."

What about women? Lee Thomas, who developed the program, says the vast majority of modem users are men and that for a similar female-oriented program to work, it would need to be accessed some other way. He goes on to say that the female role-playing aspect of the program has yet to be fully explored.

Rates for The Dome are approximately $4 an hour—a steal when compared to the $15 admission fee for many posh clubs. The average call, says Thomas, lasts 15 to 20 minutes. Romantic Encounters awaits you at (818) 345-9560. ■



Illustrations: Heidi King

Proudly Announcing The IBM IIe?

As an incentive to attract new subscribers, another IBM personal-computer-specific periodical—not *PC Magazine*—is offering a digital desk clock shaped, oddly enough, like a personal computer. Ordinarily we wouldn't have been all that surprised, except that the gift computer clock being given away is clearly an Apple IIe. ■

If It Looks Like A Duck. . .

Southwestern Bell is no longer directly affiliated with AT&T, and its San Antonio, Texas branch, like an adolescent showing off its new independence, placed the spitting image of the IBM PC on the cover of its 1985 directory. A company spokesperson denies that it is promoting IBM computers, saying that the pictured machine is "a generic piece." ■



One Size 11 Hightop Network, Please

Local area networks are gaining strength as a business solution to intraoffice communications, but we hear that the most common LAN found in Silicon Valley is still *SneakerNet*: taking the floppy disk from one computer and dashing with it, in hand, over to another. Not surprisingly, this LAN is always up and running. ■

IBM Gets the Bends

Underwater breathing may soon be a reality—thanks to Duke University research scientist William Anderson and his PC-XT.

Anderson is developing an artificial gill that mimics the breathing process of a fish by extracting oxygen from the water. The gill is strapped to a diver's back much like a scuba tank and is battery-powered.

A remote XT controls the valves that regulate the flow of water into the gill. It also gathers and analyzes data received from oxygen gauges, monitoring voltage and temperature.

The unit should be working by the end of this year. Anderson ponders such future uses as having thousands of divers equipped with XT-driven gills farming the ocean floor. The only ergonomic problem is where to strap the monitors. ■

The Unkindest Cut of All

"Our motto is that we will take your problems and cut them down to fit our solutions," says Marty Moleski, a Jesuit priest from Washington, D.C. Father Moleski has developed a new word processing package called *Procrustes*, named after the mythological innkeeper who stretched guests' bodies or cut off their legs to fit them into his beds. We can't wait to see the spelling checker. ■

Do As I Say, Not As I Do

Enclosed with every *CopyIIPC* program is a skinny "Thou Shalt Not Dupe" pamphlet from ADAPSO, the software industry's antipiracy watchdog. Presumably, the user who buys one copy of *1-2-3*, 100,000 blank disks, and *CopyIIPC* has an awful lot of data. ■

The PC Beat

Heard anything unique and unusual about personal computers or their programs lately? We pay $50 for every item published. Send your entries to PC Communiqués, *PC Magazine*, One Park Avenue, New York, NY 10016; (212) 503-5293; MCI Mail 157-9301. ■



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PC UPDATE BY VIRGINIA DUDEK

NEW YORK - Software Publishing of Mountain View, Calif., has announced an enhanced version of PFS:WRITE word processing software. Five new features have been added, including an integrated spelling checker with a dictionary that corrects misspellings, repeated words, and irregular capitalization. Also added are support for documents up to 250 characters wide and additional character enhancements, such as italics, superscripts, and subscripts. Rounding out the changes are microjustification and a feature that lets you save text as you edit it. PFS:WRITE still sells for $140. Updates are $35 for one, $70 for two, and $75 for three to five. For larger orders call Software Publishing.

* * *

Corporate Data Sciences Inc. of Santa Clara, Calif., has announced major upgrades of its CDS 2300 Laser Printer. A new spreadsheet graphics mode compatible with 1-2-3 has been added to take advantage of the printer's 300-dot-per-inch resolution. A native graphics mode lets you program specific features, such as reverse block printing, true polygon fills, and dot-dash lines. Nineteen ROM-based type fonts have been added, with five type styles that include bold, italics, and underline. The line printer mode allows horizontal printing of wide spreadsheets, reports, and organization charts. The printer retails for $5,995.

* * *

Mouse Systems of Santa Clara, Calif., announced PC Paint Plus, an enhanced version of its color paint program, PC Paint. The new version allows integration of pictures, text, and graphs. You can load and edit files from any PC-compatible word processor as well as charts and graphs created with programs such as 1-2-3. PC Paint Plus also lets you magnify and print a portion of the graphic you are working on, create or load drawings and text, and rotate them at 90-degree intervals. A 64-color palette is available. PC Paint Plus supports over 47 printers as well as IBM's EGA. Upgrades are free on copies purchased after September 1, 1985, and $25 if purchased before that date.

* * *

Applied MicroSystems Inc. of Roswell, Ga., released Version 2.0 of Office, an icon-driven office-automation package. Enhancements include a representation of paper tape that comes out of the top of the pop-up calculator. All the video I/O has been rewritten in assembly language. Also, the two-drawer "file cabinet" icon has been redone so that you can retrieve data stored in the file cabinets by cursor selection instead of by typing in the document name. Upgrades are $10 plus the master disk. Also, the price has fallen from $99.95 to $79.95.

* * *

Short takes: Microsoft Corp. and Microrim Inc., both of Bellevue, Wash., have announced that Microrim's R:base 5000 will be distributed and marketed by Microsoft everywhere but North America and the Far East. Under the name Microsoft R:base, the product will be translated into French, German, Spanish, Swedish, Italian, and a U.K. English version ... Data General Corp. in Westboro, Mass., has cut prices on all three models of the Data General/One portable as follows: $2,195 for a 256K-byte one-drive system, $2,695 for a 256K-byte two-drive system, and $3,195 for a 512K-byte two-drive system. Add-on memory prices have been cut as well. The 128K-byte and the 256K-byte additions are now $250 and $495, respectively, a 58% cut ... Media Cybernetics of Takoma Park, Md., released a version of the HALO library of graphics subroutines that is compatible with the Epson JX 80 color printer. It also supports Corona's Laser Printer and Hewlett-Packard's Laserjet ...

PC Update reports on software and hardware enhancements. To contribute, write or call Virginia Dudek, PC Magazine, One Park Ave., New York, NY 10016. (212) 503-5265.

Borland Ships Database

BY BILL HOWARD

SCOTTS VALLEY, Calif.—Borland International Inc. has entered the low-cost database market by purchasing a high-priced database and chopping the program's price to an affordable $99.95.

Borland recently purchased Analytica Corp. and changed the name of Analytica's new and well-regarded program *Reflex* to *Reflex: The Analyst*. In addition to this action, Borland did away with the program's copy protection as well as the $495 list price. According to a Borland spokesperson, the current $99.95 "introductory" price is slated for an increase to $149.95 as of April 1, 1986.

"We've been swamped with orders," says Borland president Philippe Kahn, "much more so than with any other product we've introduced."

According to Kahn, the Analytica purchase also gives Borland access to other, as yet unnamed, products under development by that company.

Turbo Editor Toolbox

Capping a busy fall that saw the introduction of *Turbo Lightning* (see "Lightning Strikes," page 112), Borland also announced *Turbo Editor Toolbox*, a software program that lets Borland Turbo Pascal users build or customize their own text editors or word processors. In a related move, the company also established a site-licensing policy for Borland products.

Turbo Editor Toolbox costs $69.95, and is not copy-protected. Its multiple windows permit users to view other files without leaving the current file.

> The Analytica purchase gives Borland access to other, as yet unnamed, products under development.

Site Licensing

Under the newly established site-licensing policy, Borland International's best-selling *SideKick* and *SuperKey* programs can be licensed for $25,000 for up to 2,000 copies per program, $50,000 for unlimited copies per program, $35,000 for up to 2,000 copies of both programs, or $75,000 for unlimited site-licensing to both programs.

For more information about the company and its products, contact Borland International at 4585 Scotts Valley Dr., Scotts Valley, CA 95066, (408) 438-8400. ■



READ ONLY

A review of the IBM Personal Computer Family. Vol. 2, No. 3



HARDWARE NEWS

A growing family of PC Printers.

Different jobs demand different printers. IBM has developed a full line of printers for its Personal Computer Family to answer those demands. Two of the most recent—the IBM Proprinter and the IBM Color Jetprinter—deserve special mention.

Both are compatible with the IBM PC Family of Personal Computers as well as with many other leading home and office personal computers. And both offer the traditional high standard of IBM reliability and support.

The IBM Proprinter.

The IBM Proprinter alone can help you complete a variety of different home or office jobs.

It has an unusual feature that will be welcomed by everyone who has spent time switching back and forth from single-sheet to continuous forms printing. A special slot in the front of the Proprinter allows you to print single pages or envelopes quickly and easily without removing the continuous forms paper.

The Proprinter's high-speed (200 cps), dot-matrix technology can make short work of your day-to-day printing tasks like first drafts of letters or reports.

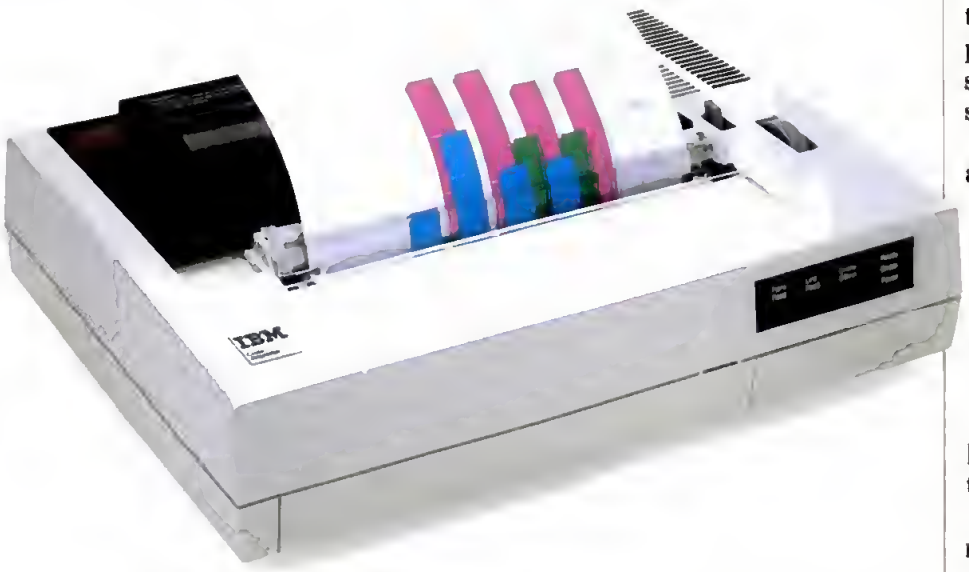
For more finished work, the Proprinter does near-letter-quality printing (at 40 cps) and lets you add emphasis to your text (at 100 cps) with bold print, condensed print and underlining.

It also has all-points-addressable graphics capabilities that can help you produce a complete range of charts and graphs to illustrate your text.

One additional plus: it's very competitively priced.



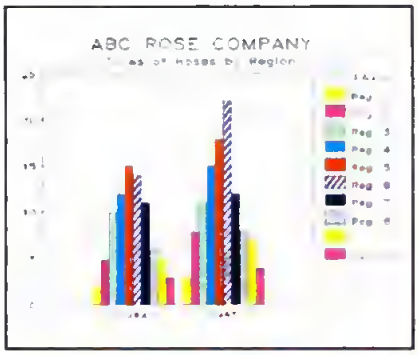
IBM Proprinter has a convenient slot for printing envelopes or single pages.



IBM Color Jetprinter quietly utilizes "drop-on-demand" ink jet technology.

The IBM Color Jetprinter.

The IBM Color Jetprinter is an unusually quiet, compact workstation printer that utilizes advanced "drop-on-demand" ink jet technology.





Samples of color graphics and texts produced by IBM Color Jetprinter.

Designed to be used with the IBM PC and many other personal computers, it's supported by a wide selection of software programs.

You can use it to produce draft and near-letter-quality text and high-quality graphics in up to seven colors.

In addition, the Jetprinter allows you to highlight your text with bold and underlined passages done in color or printed against a background color.

The Color Jetprinter also prints graphs, charts, engineering drawings and texts directly onto special Jetprinter transparencies for presentations.

And, thanks to a unique non-clogging ink formula, it performs all these functions very reliably.



FAMILY TIES

Videotex connections.

Videotex provides a key to much of our future shopping, entertainment and business information. Videotex services, using existing telephone lines, already supply travel information, personal shopping options and personalized messaging, banking and investing services.

PC Videotex software from IBM allows you to access these services from your IBM Personal Computer, IBM Personal Computer XT,™ IBM Personal Computer AT® or IBM PC*jr*.™

With only a few simple commands, you can use your IBM PC to receive, display, store and replay the data you choose in high-resolution color graphics and texts.

And if you need more than information retrieval, PC Videotex, in certain configurations, can be used to support your own Videotex data base.

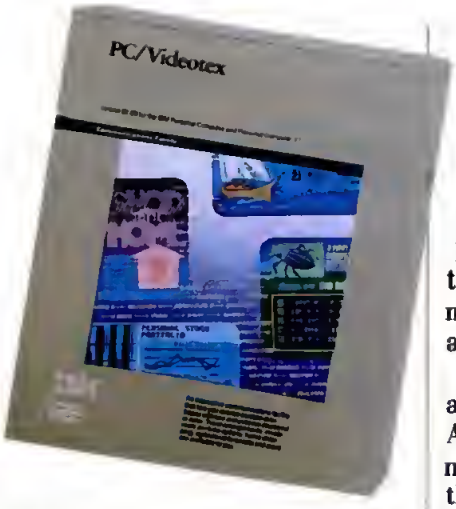


WHAT'S THE PROGRAM?

Create your own presentations.

Everyone who has ever put together a visual presentation for a business meeting or other educational purpose can now take heart. With the help of IBM PC Storyboard software, an IBM PC and a color graphics monitor you can turn out professional-looking, captivating presentations complete with color, special effects and eye-catching graphics.

PC Storyboard's four modules—Picture Taker, Picture Maker, Story Editor and Story Teller—make it fast, easy and comparatively inexpensive to create, combine and modify pictures and stories. There's even an animation function that makes it possible for birds to fly, ships to move across water, words to become bigger.



IBM PC Videotex software makes Videotex connections in high-resolution color graphics and text.

Picture Taker lets you store the contents of screen displays from software you regularly work with, such as spreadsheet, business graphics, drawing or word processing programs.

You can use the Picture Maker module to edit and combine the graphics you've saved. Picture Maker also allows you to create completely new pictures containing both text—in a variety of type styles—and graphic figures.

Story Editor helps you organize and edit your pictures into a presentation and add various special effects. The results can be dramatic.

You can then use the Story Teller module to display the results on an IBM PC Color Display, on a TV or with a video projector.

The finished presentation can be copied on diskettes for distribution. You can also produce printed copies with a graphics printer like the IBM Color Jetprinter reviewed in this issue of *Read Only*.

After that, all you need is a director's chair from which to view the finished product.

Expand capabilities with IBM Planning Assistant Solutions, IBM Document Retrieval Assistant and PC Storyboard software.

Information at your fingertips.

A few months ago in this space, we reviewed Office Correspondence Retrieval System (OCRS) software from IBM, which provides a convenient way to keep track of information that otherwise might be filed and never found again.

That same application is now available as a member of the IBM Assistant Series, with an easy-to-use menu system that's consistent with those found in other Assistant Series programs.

Like the original OCRS software, IBM Document Retrieval Assistant makes life much easier for anyone who stores large amounts of information on a fixed disk or who has a library of documents, memos or files stored on diskettes.

First, it automatically summarizes information and stores it for future reference. Second, and most important, Document Retrieval Assistant allows you to locate information with simple English-language queries.

Among other popular word processing software, Document Retrieval Assistant works with IBM Writing Assistant, IBM PCWriter, the IBM DisplayWrite Series, and WordStar® (version 3.10 or higher).

WordStar is a registered trademark of MicroPro International Corporation.

Financial planning.

Life is riddled with seemingly straightforward questions that result in headaches instead of answers. Questions like, "What's my net worth?" and "How much will my monthly payments be?"







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Planning Assistant Solutions includes spreadsheets like Loan Calculation and Real Estate Analysis for home use. Others, like Travel Expense Form and Financial Statement Worksheet, can help you sort out your business finances.

Many of the spreadsheets can use information from files you've created with IBM Filing Assistant. You can also include the results of your Planning Assistant Solutions work in IBM Writing Assistant documents and present them graphically with IBM Graphing Assistant.

BASIC improvements.

It's good to know that in a business based on technological advances, the basics aren't forgotten.

The IBM BASIC Compiler 2.00 gives exactly that reassurance. It's an improved version of an indispensable business programming tool for the entire Family of IBM Personal Computers.



IBM BASIC Compiler 2.00 updates an indispensable business programming tool.

Among many significant improvements, the most recent version of IBM's BASIC Compiler includes better program control structures, allows you to compile larger programs and supports larger arrays. It also supports the IBM PC Network environment, provides better access to your IBM Disk Operating System (DOS), runs under TopView, and offers expanded graphics capabilities.

And there's a trade-up offer for current licensees that represents a significant savings on the IBM BASIC Compiler 2.00. See your Authorized IBM Personal Computer Dealer or IBM Product Center for details.



HARDCOPY

Guides to the top.

IBM TopView™ is a program that allows you to run more than one program at a time (multitasking) and to view screens from more than one program on your display (windowing). This, in turn, makes fast work of switching back and forth among programs that you use frequently—word processing, filing and spreadsheet applications, for example.

The TopView Application Guides shown below are now included when you purchase a TopView program. They're useful listings of the many programs—IBM applications and software from non-IBM sources—that can be used with TopView. Both are arranged alphabetically and include special operating considerations and notes whenever necessary.



TopView Application Guides now included with the program.

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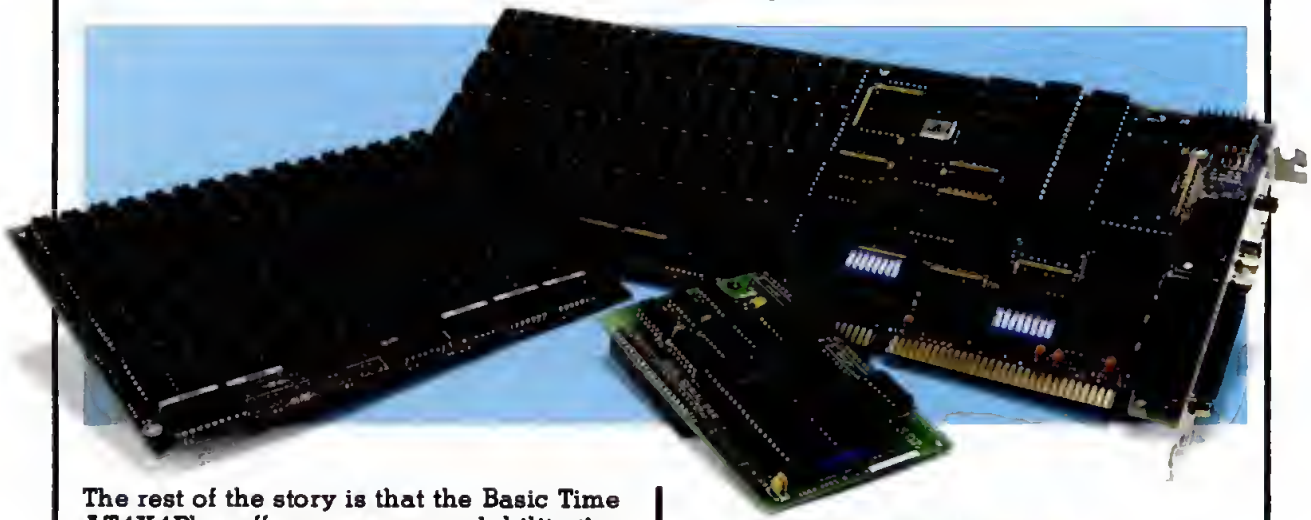
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IBM

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Imagine 4 Megabytes of memory, serial & printer port, for less than $1000. And that's just part of the story...



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More Expandability

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AT4X4-2MB	2 meg, 1 serial, 1 parallel,	**$595**
AT4X4-2S	Second Serial Port Option	**$40**
AT4X4-RAM	2 Megabyte RAMPAK	**$395**
AT4X4-SER	SerialPak with 2 serial ports	**$129**
AT4X4-GAME	Game Option	**$25**

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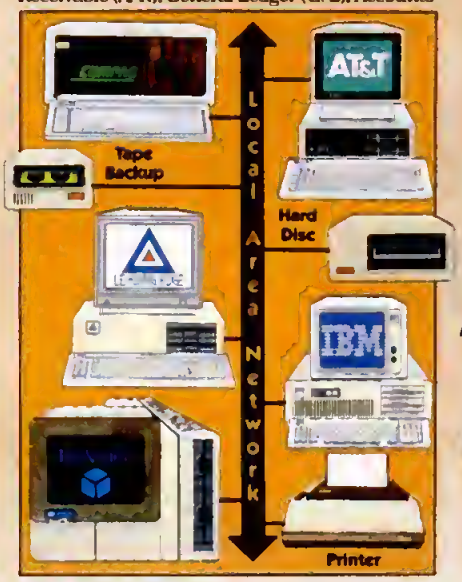
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CIRCLE 263 ON READER SERVICE CARD

Homebase: SideKick's Toughest Competition Yet

FIRST LOOK

BY M. DAVID STONE

Homebase, the newest challenger to *SideKick*, isn't perfect, but for hard disk machines, it will be hard to beat.

Like *VisiCalc*, *SideKick* was one of those programs that opened up new vistas for personal computers. Almost inevitably, the program sold well and spawned imitators, all trying to improve on the original.

Homebase from Amber Systems Inc. is one of the latest imitators and also one of the best—not surprisingly, since the man behind it is Alex Morton, who was with Borland International when *SideKick* was developed.

Marketing Magic

How good is *Homebase*?

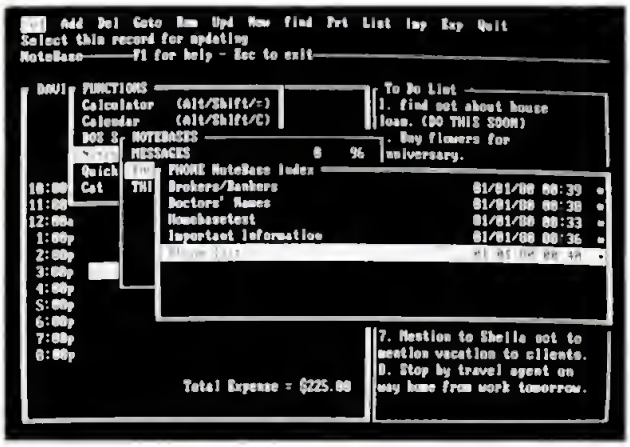
When Amber System's Morton demonstrated a beta test of Version 1.05 at the PC Magazine Labs, one of the editors concluded that at $49.95, *Homebase* might actually be underpriced. The Amber representative handed the *PC Magazine* editors review copies of both Version 1.04 and the beta test of 1.05 and left the offices smiling. Version 1.05, due to have been shipped October 1, was the first version Amber believed was comparatively bug-free. Earlier versions have been out since May; free upgrades were to have been sent to all pre-1.05 buyers.

Homebase is potentially good enough to do to *SideKick* what *1-2-3* did to *VisiCalc*, leaving the first-generation program in the dust. I've tested, played with, and simply used both versions of the program on an AT and a PC and have come away impressed.

Homebase includes seven functional utilities: a calculator, a calendar, DOS services, an editor, a cut-and-paste facility, a note file system, and a communications terminal.

Feature Specifics

For programmers, the calculator can toggle between the decimal and hexadecimal numbering systems. (Binary is not an option.) More interesting, though, is the way in which the calculator handles variables and formulas. This *Homebase* utility will let you define up to 26 variables. You can enter these either one at a time or in a formula (a + b - c/d), and *Homebase* will ask you to define each term. The calculator also has a few other features, including an on-screen "paper tape" with an option to send the information to the printer.



Homebase, *the latest desktop organizer, is like* SideKick *with more power and more overhead, but it takes up a minimum of 167K bytes of memory.*

The calendar includes monthly, weekly, and daily screens as well as some handy features. The weekly calendar highlights the times of scheduled appointments each day. The daily calendar shows the details. An optional alarm will open a window on the computer screen and sound an alarm, even if you are in another program. If more than one person uses the system, *Homebase* can maintain a separate appointment calendar for each user.

Also worth mentioning is that the daily calendar includes a column for recording expenses and a separate section for a useful "to do" list. The items not finished on the to-do list can be automatically carried over to the next day.

The DOS services utility in *Hamebase* provides a menu-driven approach to DOS commands. This includes the ability to sort files by full name, file extension, size, date, or time.

The built-in editor is similar in most ways to the notepad in *SideKick*. This utility provides a window for writing and storing temporary notes or grabbing a text file to look at. Like *SideKick*, the *Homebase* text editor is based on *WordStar* commands.

The cut-and-paste utility feature is fairly standard for this kind of program, providing a quick and easy way to capture part or all of a screen and move the information elsewhere.

The note file system, or "notebase," is one of the best features on *Homebase*. Essentially, it is a built-in, text-based database program suitable for either free-form text entry or template-based entry. It can be used for such things as names and addresses. The program can maintain as many notebases as will fit on the disk and allows you to search for keywords through an easy to use index or through the full text of each notebase.

The communications program, finally, is a full-fledged smart terminal program, complete with such standard communications software features such as autodial, file transfer, and even Xmodem protocol file transfer. The commands are modeled on *CROSSTALK XVI*, so that this *Homebase* utility, called Quick-Term, has roughly the same relationship to *CROSSTALK* as the *Homebase* text editor has to the *WordStar* word processing program.

Trouble Shooting

Alas, nothing is perfect, and *Homebase* does have some real flaws. The alarms, for example, do not automatically reset when the system reboots, and they don't work reliably after 8 p.m. The program also has other problems. One bug does strange things to the cursor, occasionally changing the small, blinking line to a fat, bright rectangle on leaving *Homebase*.

Naturally bugs can be fixed, of course. More problematical is the fact that the program is large in size, meaning it takes a long time to load. Loading *Homebase*, Version 1.05, on a floppy-based 1M PC takes well over a minute and the program ties up 167K bytes of RAM, with its default 20K-byte buffer. Even then, the program needs an additional overlay file on the disk. *SideKick*, in contrast, takes up about 54K bytes when set with a 4K-byte buffer and stays entirely in memory.

If you have a floppy-based system, a small amount of memory, or lengthy spreadsheets, *Homebase* may not be the program for you. But, if you have a hard disk system with lots of memory, the cost in memory space seems well worth the gain. ■

Hamebase
Amber Systems Inc.
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New Multifunction Boards Offer Peek into Future

Creating a new multifunction board doesn't require much more genius than that needed to operate the average shoehorn. All you've got to do is make everything fit. Little wonder then, that everyone today is building PC multifunction boards at prices very close to $100.

Real genius, however, means making multifunction boards better. An ordinary board can be designed on a Xerox machine. But finding the weaknesses in the traditional product or expanding on the expected sexumvirate of features requires a great deal more insight.

Two old names in PC peripherals have come up with novel additions to their multifunction products that are not just genuine improvements but may also mark the future directions of the industry.

No Mistake About It

Orchid Technology's new Eccell board for the AT is probably the first product to bring the mainframe technology of error correction to the PC. The error-correction circuitry in the Eccell allows it to detect memory parity errors and repair them before your system has even thought about crashing.

Other PC products, including the system boards of the PC, XT, and AT themselves, use a technology called error detection. For every byte of memory, an extra bit, called a parity bit, is allowed to serve as a quick check of the correctness of the data stored in the other 8 bits.

The parity bit is set to 1 or 0, high or low, depending on the modular total of the rest of the bits in that particular memory byte. When all 9 bits are summed together, the result is always the same. If the computer detects a different total, it knows that one of the bits of the memory byte has changed when it wasn't supposed to.

IBM's way of dealing with such erroneous bytes is somewhat draconian. The whole computer system shuts down.

The error-correction circuitry of the Eccell uses several additional bits per byte, enough not only to detect whether one bit has changed but also to identify which bit went bad. Then, knowing exactly where the problem arose, the error-correction circuitry changes the bad bit to good.

With Orchid's Eccell, you may never be confronted with a parity check 2 error again. I hedge a little because if two bits in a byte go bad, the Eccell shuts down just like a PC with only one bad bit.

With the addition of a daughterboard, the memory capacity of the Eccell can be expanded, and other multifunction features—parallel or serial ports—can be added. Not too bad for a base price of $595.

Emulating Disks

Tecmar's bit of insight is that the bulk of add-on memory is often used for high-speed floppy disk emulator programs. Consequently, in its newest multifunction product, the MegaFunction board, it has added what amounts to the ultimate RAMdisk—not a floppy disk emulator but a hard disk, 768K bytes big.

What distinguishes the MegaFunction board virtual disk is that its memory is almost completely nonvolatile and can even be used to boot your system. A thin power cable trailing from the MegaBoard to a small transformer keeps the board alive when you turn your PC off. A 1-hour backup battery pack is also available.

Two old names in PC peripherals have come up with novel additions that may mark the future direction of the industry.

Although neither Tecmar nor I would recommend that you put your most valuable data files on the MegaFunction RAMdisk without backups somewhere safe, it can be the perfect place to put the programs that you use every day. You'll add a new, lightninglike touch to your daily data processing.

New Price Barrier

In case you have doubts that the Xerox school of engineering is breaking through the price barrier, I'll share the name of the lowest-priced complete multifunction card I've found. With a full 384K bytes of 200-nanosecond RAM, serial, parallel, and game ports, a clock, print spooler, and RAMdisk software, the Custom Micro Multifunction Board weighs in at $129. Of course, that's the current price as I am writing this article. You can probably expect Custom Micro to have found some competition or simply reduce its price by the time this article appears in print.

One final word, just in case you've detected a bit of error in your ways at being the first on your block with any new PC product or a new model of the PC itself—what with prices plummeting faster than a detective's arches—remember: The original price you paid also includes the value you've gotten from your computer in the days you would have spent waiting for the new miracle to appear. That is, unless you bought everything yesterday and the prices were slashed today. While everyone else was waiting for the big price reductions or trying to build up their bank balances, you probably learned enough to make all those slowpokes look like personal computer sissies.

If that reassurance doesn't make you feel better despite your having unduly whittled down your collection of dollar bills, you probably know how I feel—at least until I find a new computer toy to play with. ■

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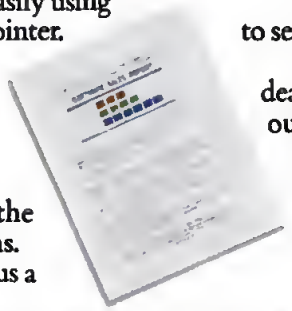
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The Networking Nightmare

Local area networking is an idea whose time has come. And gone. And come again. Now that DOS 3.1 has emerged as a file-sharing standard, networking is a lot less wild and woolly.

In its brief life span, local area networking has undergone radical changes. It still looks the same on the surface, but the ownership equation is completely different.

Back in the dim, dark ages of 1983, PC-XTs were rare commodities. Hard disks were very hard to come by. Printers were extremely expensive. Sharing peripherals made a great deal of sense. The cost of a network adapter card was less than half that of a hard disk, and the PC's measly power supply couldn't hack the hard disk anyway.

Then there was the glamour of networking. The technically avant-garde (myself included) were wowed by the mere fact of networking. That you could hook two or more personal computers together and share files, send mail, and redirect print output was a significant achievement. Never mind that you had to replace COMMAND.COM with a version that worked almost like the original. Ignore details like BASIC resetting the hardware and bringing your network to an abrupt halt. Disregard the minor inconveniences, such as applications that would overwrite one another's file allocation tables, cavalierly dispensing with your day's work. This was *networking*, and no price was too high to pay.

Within networking circles, battle lines formed around the interconnection techniques. There were proponents of twisted pair, proprietary cabling schemes, and coaxial. Coaxial came in several incompatible flavors, including Ethernet, broadband, and miscellaneous carrier-sense multiple-access techniques.

Then cheap hard disks appeared. While they didn't stop networking cold, they certainly blunted its thrust. They reduced many of the issues raised by network vendors to random noise. PC-XTs became plentiful, and the networking vendors responded by working the XT in as a file server. Few bothered to mention that PC-XTs make very lousy file servers, but it was *networking*.



Bill Machrone

What Do Users Want?

What were users asking for while all this was going on? Minicomputer functionality, coupled with all the power of individual PCs. They might as well have been asking for the moon.

If you've ever spent much time with a minicomputer, you know it's easy to get hooked on the functionality, power, and convenience. You communicate through inexpensive ASCII terminals, and while the display speed isn't great, clever programming can give you full-screen editing, and graphics to boot. Any midsized mini worth its salt responds just as fast as you can press the keys when editing and loads files faster than a floppy-based personal computer. And, of course, everything is there: No floppy disks to change, no messy floors to mop.

But the real story behind the mini's success is the operating system. They range from ethereal (Data General's AOS) to hard-headed practical (HP's MPE); from the sublime (UNIX) to the ridiculous (DEC's RSTS). The operating systems have one thing in common: They share data and resources and they do it well. The toughest task for PC networks is interactive data sharing. Minicomputers have been doing it from day one, no sweat.

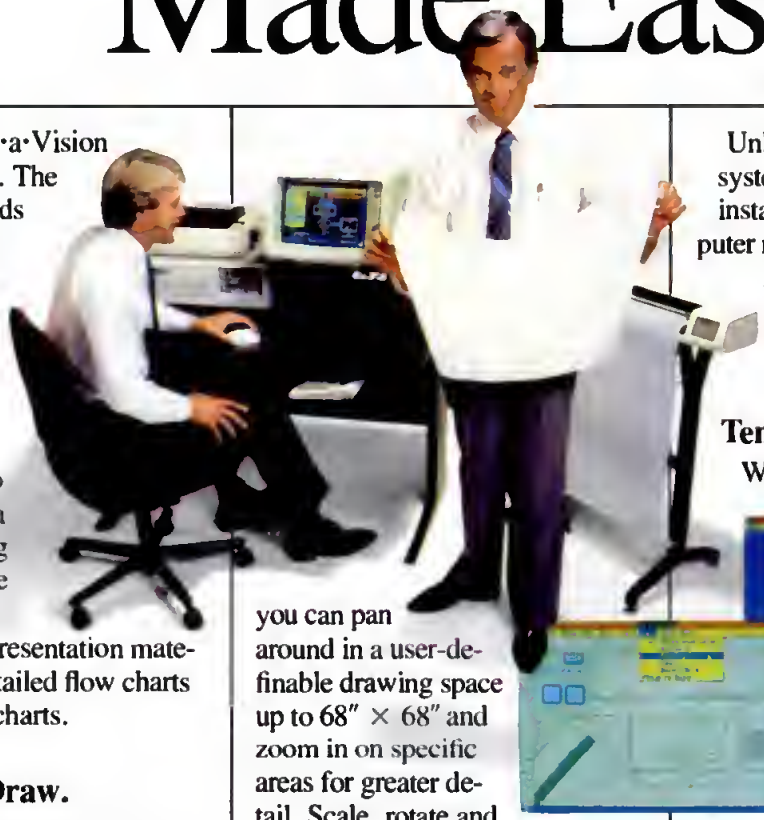
The other thing that minicomputers have going for them is maturity. There are thousands of programmer hours in their operating systems. They've dealt with contingencies that personal computer networkers haven't even begun to think about. Let me give you an example.

Working Stiff

Hewlett-Packard's MPE is the wonderfully unobtrusive operating system that has made the company's 3000 series popular among business and scientific users alike. Half a dozen years ago, I was the manager of a project in which we were converting a large mainframe system, written in COBOL, to run on the HP. The final step was to install the system by recompiling all the programs (more than 40) on the customer's 3000. We figured that the compiles and acceptance test would take about 9 hours. We started early that morning and were looking forward to our pizza-and-

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beer reward for a job well done.

There was construction under way next door to the customer's building. Midafternoon, a guy with a backhoe dug up the power cable to our building. As the lights went out, we vociferously exercised a very limited subset of the English language. The HP had on-board battery backup that could keep the machine alive for 45 minutes to an hour. It went into "sleep" mode, with only an occasional ripple on its 16 status register lights. We had put its four disk drives into standby mode, per standard procedure. An hour and a half later, the power came back.

Is your network ready to protect your work? No? Then think carefully about the tasks you give it.

The HP's status register was flashing merrily, indicating that it was doing something, but all of the terminals were locked out, so we had no idea what was going on in there. We powered up the disks, and their access lights showed that the system was using them. After a few more minutes of no response at the terminals, we figured it was reading and writing garbage. We started to power down the drives, dreading the thought of a cold restart on the system and the long night of work that lay ahead.

Suddenly, a terminal unlocked. A programmer exclaimed, "Hey, it's my editing session, just where I left it!" Now MPE is a polite operating system. It never beeps at you, even when you blunder seriously. Instead, it displays your error message in a somber "tombstone" on your terminal. The system console had been locked out with all the other terminals. Suddenly it came to life and said, "Drive 2 not ready. Make drive 2 ready RIGHT NOW!!!" And it beeped three times.

We answered MPE's demand, and it simply picked up where it had left off.

Conclusion

Is your network ready to take such a proactive stance to protect your work? No? Then you had better think carefully about the kind of tasks you give a network. Or you had better invest heavily in uninterruptible power sources. Or both.

The emergence of DOS 3.1 as a file-sharing standard has made networking a whole lot less wild and woolly. But it's still an emergent product, one that's getting better every day. Tasks like sharing files and laser printers are well within reach. For the rest, you'll have to wait.

By the way, pizza and beer never tasted better. ■

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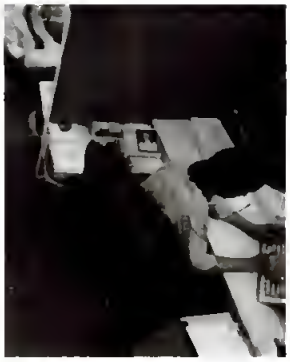
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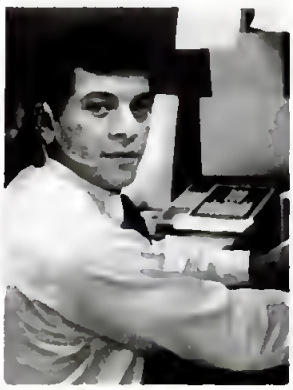
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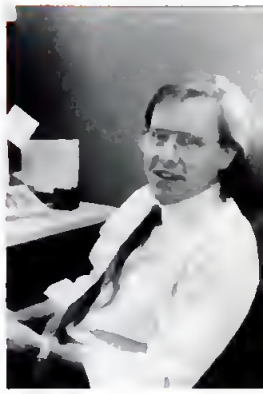






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Letters to PC Magazine

Turning Japanese

Jared Taylor's article, "Japanese Printers" (*PC Magazine*, Volume 4 Number 19) shows a comprehensive and lucid knowledge of Japan, not just computers. He has done the best job in my recent memory of pulling together the important elements and creating a coherent picture of the diverse and intricate subject called "bilateral U.S.–Japan trade."

By taking out the word *printer* and some of the detailed references to printers, the



article could stand as a template that could be filled with other topics like semiconductors or RAM chips. By changing the verb tenses to the past, the article could be about cars, stereos, television receivers, and VCRs. Changing the verb tenses to the future would allow plugging in biotechnology or ceramics. I look forward to seeing more writing on any topic by Jared Taylor.

David G. Ziegler
Arlington, Virginia

Tongue Twisters

In response to your minireview of *MindReader* ("MindReader May Know What You're Thinking" *PC Magazine*, Volume 4 Number 18, page 225), I wanted to note that *MindReader*'s built-in English grammar is absolutely accurate in the regular formation of the plural, the past tense, and *ing* and 13 other suffixes. Irregular formations should be entered as separate entries in the dictionary. Your reviewer mentions the example of *goed*. When you write *went*, you type *we* not *go*. Therefore, *MindReader* follows your thought pattern by including *went* as a separate word in the dictionary.

The article incorrectly states the Rolodex file can contain 23 names, addresses, phone numbers, titles, and salutations. The actual number is up to 175.

MindReader's insert is the drop-down style as opposed to *WardStar*'s insert. Drop-down insert is standard on Wang word processors and several PC word processors, for example *MultiMate*. The *WordStar*-like insert is old-fashioned, rooted in CP/M editors for programmers.

Kalman Toth
Businessoft Inc.
Paramus, New Jersey

In Orbit

Our thanks to Peter Norton for his kind words about our Hewlett-Packard LaserJet utility, *SetHP* in his Norton Chronicles ("Unearthed Treasures," *PC Magazine*, Volume 4 Number 20).

I'd like to inform your readers of our full address: Orbit Enterprises Inc., P.O. Box 2875, Glen Ellyn, IL 60138, (312) 469-3405.

Joseph S. Beda
President
Orbit Enterprises Inc.
Glen Ellyn, Illinois

Ribbon Relief

Because printer ribbons have a substantial effect on the quality of output and the ultimate cost of using a printer, I was surprised that almost nothing was said about this subject in the reviews and comparisons of new printers (*PC Magazine*, Volume 4 Number 19).

As quality of output is my greatest concern, I wouldn't consider using multistrike ribbons to print my final manuscripts. Multistrike ribbons move through the printer so slowly that several letters are hit at approximately the same location on the ribbon. This conserves the ribbon, but the inking of the letters is not nearly as crisp or even as output from a single-strike ribbon. Several typewriter manufacturers (including Canon and Olivetti) provide a selection of ribbons including single-strike. Can it be true that the only printer available with equivalent capabilities is the Epson DX-20?

Madelon Mottet
Friday Harbor, Washington

The type and quality of ribbons available for any printer are more often controlled by third-party suppliers than by printer manufacturers. This is especially true for multistrike carbon ribbons, where quality varies widely among various ribbon manufacturers, and one brand of ribbon may produce significantly better results than another.—Ed.

Tandy Is Dandy

I must disagree with Winn L. Rosch when he says that the Tandy 1000 is "somewhat schizoid" ("Cost-Conscious Computing," *PC Magazine*, Volume 4 Number 21). I own a Tandy 1000, and I believe it is better than any IBM PC or XT.

The legs on the keyboard are very easy to move. All you have to do is grasp the



keyboard in both hands, press the legs down from the top, and rotate them. It's simple!

The two joystick ports also serve as mouse ports, and the reset switch is located right in front, just where it belongs (in my opinion).

As for the compatibility between the IBM and the Tandy machines, I have noticed that the only programs that refuse to run on the Tandy are BASIC programs that call ROM routines. The Tandy 1000 has only bootstrap ROM since the BASIC is memory resident, which in my opinion is better because BASIC can address only

60K of memory anyway. Another advantage of the Tandy 1000 is that it comes with all the "extras" that IBM charges you for. The machine comes with DOS, BASIC, and an integrated applications program called *Desk Mate*.

The only two things I don't like about the Tandy is that the Alt and Shift keys are in the wrong place. I keep hitting the Shift key when I use the cursor controls, and the Alt key is simply inconvenient.

An advantage of the Tandy 1000 is that it comes with all the "extras" that IBM charges you for. The machine comes with DOS and an integrated applications program.

William Wright
Moberly, Missouri

Bar Chart Enhancement

A recent Programming Column gave the listings for six bar chart programs *(PC Magazine*, Volume 4 Number 13). First, I would like to say that I really enjoyed working with these programs. They have had a great impact on many projects of mine. I would like to suggest an improvement to some of the programs. The line numbers will vary from program to program. I set the program line numbers so they'll fit Program 4 (page 218), the one I like the most. You can do this too with the following changes:

```
 61 INPUT "TITLE OF CHART ",MA$
241 LOCATE 1,1:?MA$
242 LT=LEN(MA$)*8
243 DIM TITLE(400)
244 GET (0,0)-(LT,8),TITLE
245 CLS
731 LT=LEN(MA$)*8
732 LO=(320-LT)/2
733 PUT (LO,1),TITLE
```

With these changes, you should be able to tack a title on to each of the charts. The line numbers will change between the programs, but they will work. I really enjoy all of the neat ideas that you come up with. Keep up the good work.

Mathew Warner
Rocky Mount, North Carolina

Warner's modification certainly works, though the added title slightly crowds the top line of the graph's vertical axis.

An alternative is to print a title vertically, on the left side of the graph. The following code (using Warner's line numbers) permits a 22-character vertical title.

```
 61 INPUT "TITLE OF CHART: ",MA$
241 FOR AZ=1 TO 22
242 LOCATE AZ+2,1
243 PRINT MID$(MA$,AZ,1);
244 NEXT
```

If you try our suggestion after entering Warner's modification, zero out his lines 245 and 731–733.—Ed.

Multilingual Scribe

In Reviews in Brief, Cheryl J. Goldberg reviewed a Hebrew/English word processor ("Hebrew/English W.P." *PC Magazine*, Volume 4 Number 20, page 226) that costs $875. For the last year I have been using the *Multi-Lingual Scribe* by Gamma Productions Inc. It allows me to write not only in Hebrew and English, but also in Greek and Russian, and it costs only $125. At this low price, *Multi-Lingual Scribe* is within reach of scholars and students alike.

I can use many alphabets in a single document. With an optional utility package, I can design and use my own alphabets. This option allows me to use any alphabet—English, Thai, or Urdu, for example. While it is not as sophisticated as *WordStar*, it has been more than satisfactory for letters, articles, glossaries, exams, and so forth.

When printing, I can also adjust the size of the letters since it prints in graphics mode on most Epson graphics-capable printers. It would be perfect for me if the company came up with a Hebrew and Russian spelling checker.

I suggest you let your readers know about this product. You can obtain it from Gamma Productions Inc., 817 10th St., #102, Santa Monica, CA 90403, (213) 451-9507.

Maurice E. White
Papillion, Nebraska

Upgrading from 64K

In the October 1 issue of *PC Magazine*, an article by Peter Feldmann ("Upgrading Your 64K PC," *PC Magazine*, Volume 4 Number 20) recommends an Add-Mem board and a new ROM kit from IBM.

An alternative and simpler method requiring only board installation is the Tall Tree Systems JRAM 2 expansion board. This board can be loaded with up to 2 megabytes of memory and allows 640K bytes of RAM memory with the rest of memory being allocated to electronic RAMdisks (C, D, and so on). Then discounted cost of the board is $139. Each 256K chip set is $40.00.

I purchased my IBM PC in October of 1982 with a 64K motherboard and upgraded it with this board. It works unusually well and did not interfere with the additional Quadram board I had previously installed with 256K, clock, serial, and parallel configuration. In addition, this board comes with JRAM software that includes many additional features that alone are worth the cost of the board—features such as extremely rapid copying with JET.COM and spooler.

The Tall Tree board comes with JRAM software that includes many additional features that alone are worth the cost of the board.

The disadvantage is that it uses one slot. The advantage is the ease of installation. I added the new ROM BIOS chip to upgrade my motherboard. One item that had me calling Tall Tree, though, was that the DIP switches on the motherboard should be set for 64K when using the JRAM board.

George T. Wohl
Margate, New Jersey

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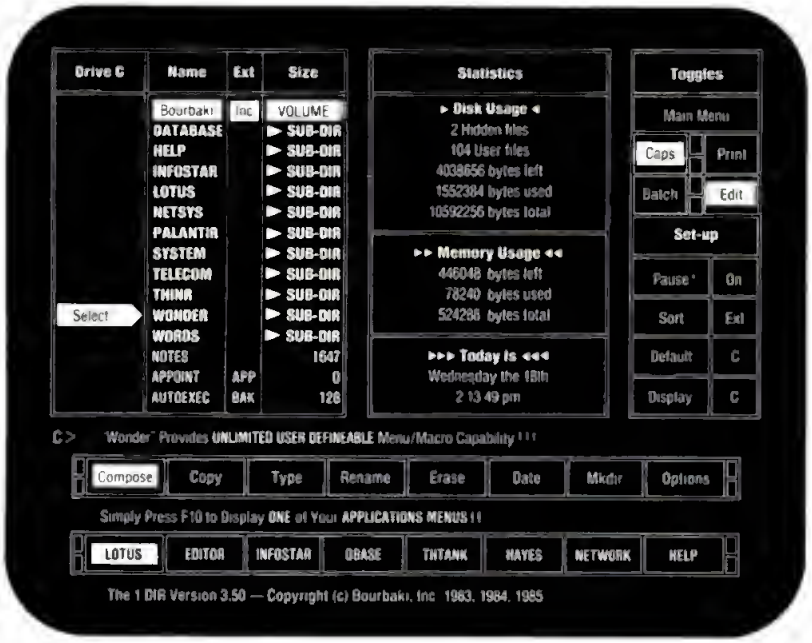
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20MB half height			
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20MB full height			
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11 **CORE** 20MB	39 ms	**$1470**	**$1320**
30MB half height			
12 **TULIN**	80 ms	**$990**	**$800**
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CIRCLE 218 ON READER SERVICE CARD

Starting the Search For Lost Files

This column—part 1 of a short series on how disks work, what can go wrong with them, and how they can be fixed—lays the groundwork for the tricky and sometimes unpredictable process of unerasing a file.

If there's any subject that I feel most experienced in, it's understanding the ways in which personal computers use their disks, how these disks can become messed up, and how they can be salvaged. At the same time, I have hesitated to talk much about this subject in these columns. The reason is that since I make the greater part of my living selling programs that recover lost data from disks, I felt it might appear self-serving if I used this space to talk about a problem for which I sold the solution.

Recently, however, editor Bill Machrone, ever a source of wisdom, reproved me for this, suggesting that my scruples in this situation had led me to withhold some fascinating and useful information that my experience qualifies me to explain. Therefore I'm beginning, with this column, a short series on the ways of disks, what can go wrong with them, and how we can sometimes fix them.

Perhaps the most interesting way to begin is with the seeming magic of "unerasing" files that we've deleted. Lots of personal computer users are amazed to think that deleted files can be gotten back at all. On the other hand, many people who know that we can recover erased data assume that it's a trivial process involving nothing more than flipping a switch in the disk to bring a file back—when, in fact, the process of unerasing a file is tricky and unpredictable.

Beginning with the Basics

A short tutorial on how our files are stored on disk will be appropriate at this point. There are essentially three parts to a file as it appears on a disk: the directory, the data, and the file map. A file's directory entry is a description of that file, which consists of the file's name, its size, when it was created, and similar information. This is what we see when we use the DOS command DIR to display directory information. Thus you can see that a file's directory entry simply gives information about that file and is not the same as the data that the file actually contains.



Peter Norton

The contents of a file, described by its directory entry, are stored in a pool of space that all the files on the disk share. The disk's space is allocated to files in units called *clusters*. On any one disk, the clusters are all the same size, but between one format of disk and another, the cluster size varies. It can range from as little as 512 bytes for a single-sided diskette to as much as 4,096 bytes for the XT's hard disk. Each file is given as many clusters of disk storage space as are needed to hold the file's data. The clusters are assigned to each file on a catch-as-catch-can basis and in no particular order—a point that will become important to us later on when we discuss how to track down the data. Sometimes a file's data is laid out in a tidy way on the disk, arranged in consecutive clusters one after another; at other times the data is scattered all over the place—a little here and a little there.

To see how the data in your own files is scattered over your disks, there are two simple ways you can learn about it. One is with the DOS command program CHKDSK. If we fire up CHKDSK with the name of a file or series of files, CHKDSK will report how many disjoint chunks of storage space each file occupies. To get an even better idea of how your files may be scattered around on their disks, you can use the mapping feature of my *Norton Utilities* program; like CHKDSK, it will report how many scattered parts the files now occupy. It will also paint a picture of the layout, giving you a graphic "feel" for the location where each file is stored.

Consulting the Map

I have demonstrated that each file's directory entry names and describes the file, and each file's data space holds the contents of that file. The third part of each file connects the two. This is what we might call the file's *map*. The map defines which clusters of disk data space are assigned to each file and locates where on the disk the file's data is found. All of the maps of all the files on each disk are stored in the File Allocation Table (FAT), which indicates how each cluster of space on the disk is used, which clusters are in use, and which

clusters are available for new files.

When we work with the data in our files, DOS finds the data for us through a three-step process. First DOS looks up the filename in the disk's directory; second, it traces the file's map through the disk's FAT. Third, since each entry in the file's map in the FAT indicates a cluster of data that is stored on the disk, DOS follows through by looking up each cluster on the disk, then passing on each piece of the file's data to us.

Erasing a File

Now, when we use the DEL command and delete or erase a file, DOS does basically two things. First, by replacing the first letter of the filename with a special code, it indicates that the file's directory entry has been erased. Second, it throws away the map of the space that the file's data occupied in the FAT, causing the clusters each entry in the FAT had originally designated as belonging to this file to become available for use by any other file that needs them.

Therefore, when you erase a file, two of the three elements—the initial letter of the filename and the map—of the file on disk are gone, but the data that the file actually contains is still written on the disk.

When you erase a file, the initial letter of the filename and the map of the file on disk are gone, but the data that the file actually contains is still written on the disk.

This means that you can still recover it.

When people ask me to explain how it's possible to recover erased data, I like to visualize the process in terms of a chalk board. You remember from your school days how each hour's class was free to use any part of the chalk boards, and you could wipe away anything that another class had left unless it had been marked "save this." That's roughly the same way things work with our disks. The files on the disk occupy portions of the disk's space, and each file is, in effect, marked "save" so that no other file can be written on that part of the disk. When we delete a disk file, it's very much like taking the "save" marking off the chalk board: What's written there hasn't been wiped away, but it's no longer protected. Consequently, it can be wiped away and written over by the next class that comes along.

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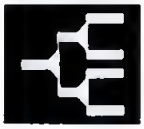
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CIRCLE 108 ON READER SERVICE CARD

So it is with the data that was stored for a file that has been erased or deleted. Erasing a file doesn't automatically erase or wipe away the data—it just means you no longer have a record of where it was.

You can recover the data if you haven't written anything new to the disk after erasing the file. But once you delete a file, there's no telling when the data will be overwritten. If you have added new data to the disk before trying to recover your erased file, your data may or may not be lost, depending on where in the disk the new data was put.

Recovering a File

In order to unerase a file, it is necessary to reconstruct the location information that was originally stored in the FAT, starting from scratch. That might turn out to be easy or difficult, as we'll see in the next column. However, we don't have quite such a severe problem when it comes to reconstructing the directory entry that described the now-erased file.

You can recover data if you haven't written anything new to the disk after erasing the file. But once you delete a file, there's no telling when the data will be overwritten.

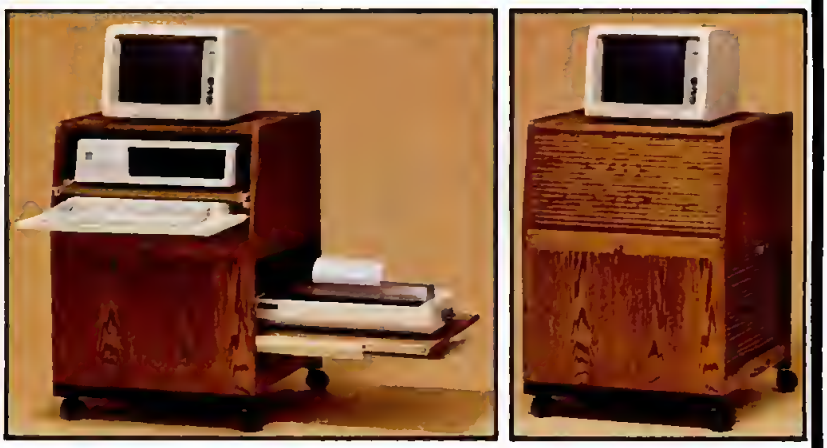
Luckily for us, when a file is erased, all the information in the directory entry—the filename, size, date and time stamp, and so forth—is preserved, with one exception: The first character of the filename is lost, since it is replaced by a special code that marks the directory entry as available and not in use. The fact that everything else, including the remainder of the filename, is left intact yields some essential clues that will help us later on with the unerasing process.

Of course, just as the discarded data from an erased file will eventually be overwritten by data from new files, so will the erased file's directory entry be reused by another file when new files are placed on the disk. But as long as we attempt to unerase the erased file before either its data or its directory entry is reused by another file, we have as good a shot at recovering the data as if it had never been lost.

The main obstacle that stands in our way is the detective work of finding the lost data and connecting it to the erased directory entry. Next time we'll see what that might involve. ■

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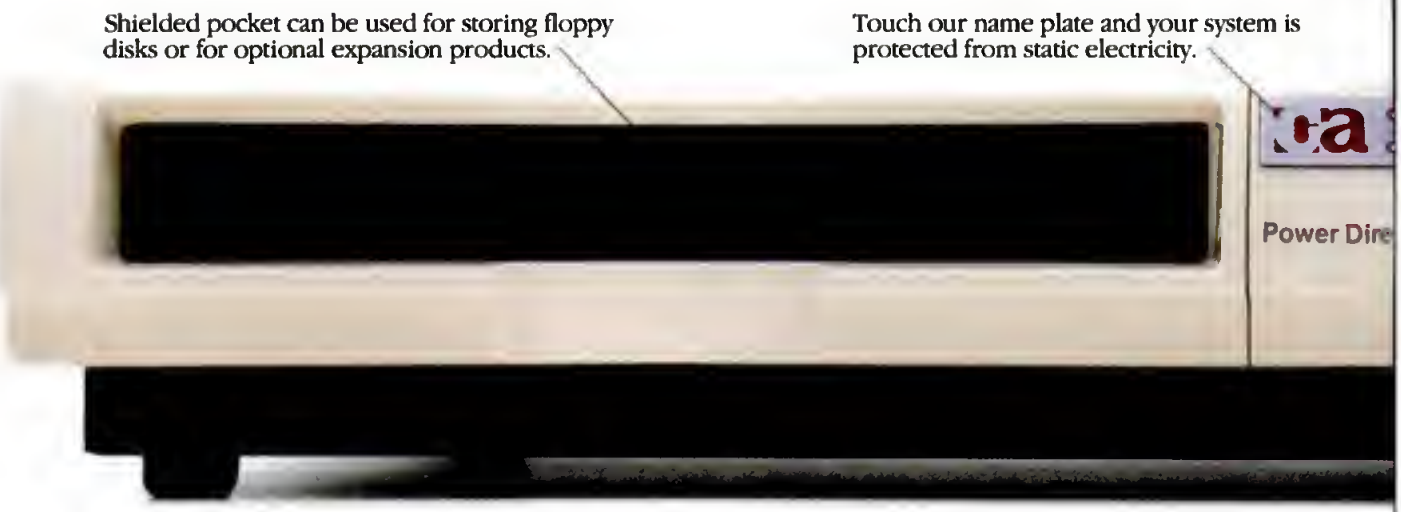
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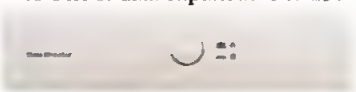
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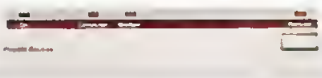
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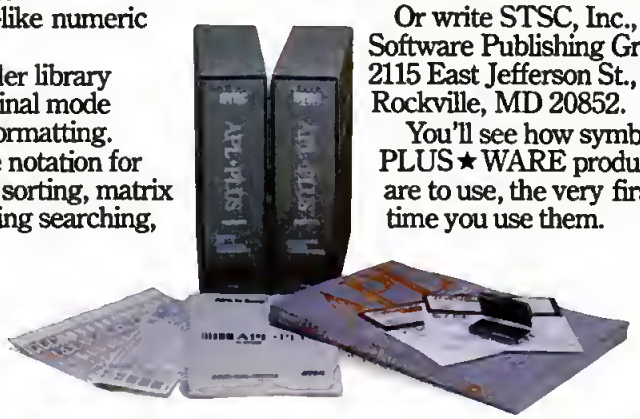
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CIRCLE 156 ON READER SERVICE CARD

The New Challenger in The Word Processing Wars

While IBM's DisplayWrite and Ashton-Tate's MultiMate slug it out for first place in the word processing market, Lotus is sneaking through the battlelines with a new concept in word processing.

Seen from the outside, the word processor market looks like a battlefield where "Word Wars" intense enough to make the Punic Wars look like a sandbox squabble continue to rage. Read the ads and the best-seller lists, and you see a number of apparently healthy, vital competitors jockeying for position.

Behind the scenes, however, the situation is actually more settled. It resembles the mature form of a classic consumer-goods market: a couple of dominant products and a few struggling competitors.

When major companies conduct product reviews to pick what will become the standard, company-approved-and-supported product for their employees' use over the next few years, the results are depressingly predictable.

Lots of good programs go into the review process—*WordPerfect*, *Samna+*, *Volkswriter Deluxe*, *OfficeWriter*, *MultiMate Professional Word Processor*, *Microsoft Word*, *DisplayWrite/3*, maybe *XyWrite*—but in the end it comes down to two. Usually, the same two: IBM's *DisplayWrite* and Ashton-Tate's *MultiMate*.

What the evolution of the market toward these two products says about us and our buying habits is interesting—if less so than what it says about the present state of the PC software business.

The reference to the Punic Wars isn't far off. When the Wars began in 264 B.C., the great city-state Carthage (read: *MultiMate*/Ashton-Tate) ruled all of North Africa, the important islands off its coast, and also controlled virtually all the commerce in the western Mediterranean. That other great city-state, Rome (read: IBM), had been busy elsewhere, concentrating on its home turf, and had nearly finished subjugating the Italian peninsula.

Fighting through three great wars over the next 118 years, the Romans and Carthaginians bet their futures on a furious battle for dominance. Careers and reputations were made and lost: Regulus lost his armies to the Greeks; Hannibal marched across the Alps (and into the history books) to invade Roman territory; and Cato the Elder brought on the final slaughter by demanding that his Romans not merely defeat but destroy the Carthaginians.



Jim Seymour

Carthage finally fell. Its citizens were dispersed as slaves to other power centers throughout Europe, and the city itself was razed, the ground plowed up to obliterate its former location.

One can make too much of historical allusions, and I don't mean to suggest Big Blue plans to explode the competition. Yet, the state of the word processing market, at least on the corporate level, where the major vendors insist they must win to remain in the game, gives pause.

You and I are not innocent, because we've given both programs their status in the market. *MultiMate* gained its substantial lead in word processing largely because it resembled a brand-name product many of us knew and liked—Wang word processing. IBM edged in by porting to the PC a good program from its dedicated word processor, the *Displaywriter*—and also, of course, from the pixie dust that falls naturally from those three letters.

So America's corporations pledge their troth to two programs that, while good, suffer from a stuffy, overblown approach to what is, after all, a fairly simple situation: grinding out office correspondence and reports.

DisplayWrite/3's nickname among some of my friends who use it is "Menus, Menus, Menus!" Unlike its ancestors, *Textpack 4* and *6* on the *Displaywriter*, *DisplayWrite/3* lacks a convenient, fast menu bypass option. Instead, it's A, ENTER; B, ENTER; C, ENTER. . . .

And keystroke economy? Three taps to start underlining a passage, three more to get out. Ditto for boldfacing.

MultiMate has menus, too, but relies a lot on Ctrl-this, Alt-that use of the PC's function keys. That's OK, once you've learned it, but the orange and avocado keycap stickers that new users use to learn the program leave the machine looking like the loser in a bout with a berserk interior designer from the 1950s.

And inserting—if you haven't seen *MultiMate* in its insert text mode, you don't know what "awkward interface" means. Ask a friend who uses the program

to show you, but be polite: Suppress your giggles at the big moment.

Despite all that, I like both programs. Each does some things very well, and both do many things acceptably. It's the stuffiness and formality of their approaches to word processing that makes them look so old-fashioned.

Having taught many office workers to use word processors, I'm convinced that you don't need all that structure for most secretarial work—let alone the typical manager's and executive's hands-on use.

But while *DisplayWrite* and *MultiMate* battle to the end—remember what happened to the Carthaginians—both are whistling past the graveyard while waiting for Lotus's probable introduction of its "smart" word processor next year.

Mitch Kapor seems as interested in text as he was in numbers when he and Jonathan Sachs cooked up *1-2-3* a couple of years ago. Everyone in the word processing field talks about "becoming the Lotus of the word processing market." But, now Lotus wants to become the Lotus of the word processing market.

What's a "smart" word processor? The best way to describe what the new generation of word processors will do that the current ones cannot do is to imagine a small, attentive servant with a very good memory living inside the program.

This "software agent"—that's the term program designers are starting to use—watches carefully what you do, how and in what order, then learns and remembers your working habits. If there's a principle to which software agents subscribe, it consists of not asking you any more often than necessary what you want to do—and guessing, wherever possible, what you are going to do next, based on what it deduces from what you've done so far.

Let's say you routinely write documents in four styles: very short letters with wide margins, longer letters with narrower margins, memos starting with the word MEMORANDUM in widely spaced boldface at the top and the usual "To:" and "Re:" format, and long text reports with underlined subheads at the left margin.

One way to ease your word processing burden would be to construct templates, or empty documents, in each of these styles, save them to disk, then call one up and fill it in every time you produce something in that format.

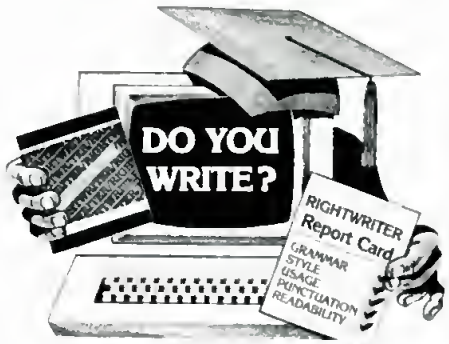
A "smart" word processing program would eliminate all that. By watching your early use of the program, it could learn your preference for document style. Then, whenever you began a new document, it would automatically select the format for short letters. As the amount of text you typed grew, it would realize that you were

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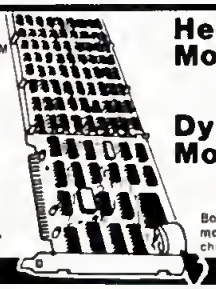
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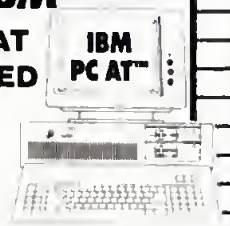
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doing a longer letter and would change the format settings. The first time you typed a subhead at the left margin, it would realize that this was supposed to be a text report and set up everything in that style.

And if you began a page by typing an M, hitting the space bar, then typing an E, it would change to the memo format, type out the balance of the word, down-space a couple of lines, tab to where you wanted the word "To:" and type it in, then await your input of the recipient's name.

A truly smart word processor can also offer an enormous range of other useful and powerful features: for example, maintaining a constant, on-line spelling checker and a synonym finder.

Don't look for everything under the sun in Lotus's new word processing package—it's the first of a new generation—but expect a lot. Yet in a market already dominated by two hot products—one a product strategically important to IBM, who will seriously consider a Lotus entry?

Don't underestimate Lotus. Remember *Visi-something*?

It's true that IBM's clout means *DisplayWrite* often gets a "bye" into the finals of these "let's pick a word processor" contests. Unfair, maybe; a fact of life, yes.

Remember, after all, that the corporate people running these little jousts are themselves users of *1-2-3*, many of them microcomputer support managers and power users who built their careers on their expertise with and affection for Lotus. Think they won't smile on Lotus's text product?

Even if that group doesn't fall for Lotus's word processor and its adapt-to-the-user style, the people who are going to review their recommendations will almost certainly be Lotus users themselves. So, if the Lotus product isn't at the top of the list of recommended choices, the people on the committee are going to get some awkward phone calls from above.

The current generation of high-end word processing packages for the IBM PC and its compatibles are the last doyens of a grand old breed, the concluding and highest expression of the saw-and-hammer approach to building documents.

We can safely assume that IBM has thought of that, too, and so have the former MultiMate International people now on the payroll at Ashton-Tate. The question is whether either group can manage that huge conceptual leap to power drills and numerically controlled lathes before the Cambridge tidal wave hits their beaches. ■

Jim Seymour, a consultant and market analyst in the computer industry, writes the newspaper column MicroBusiness and also writes for a number of business and computer industry publications.

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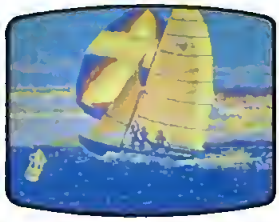
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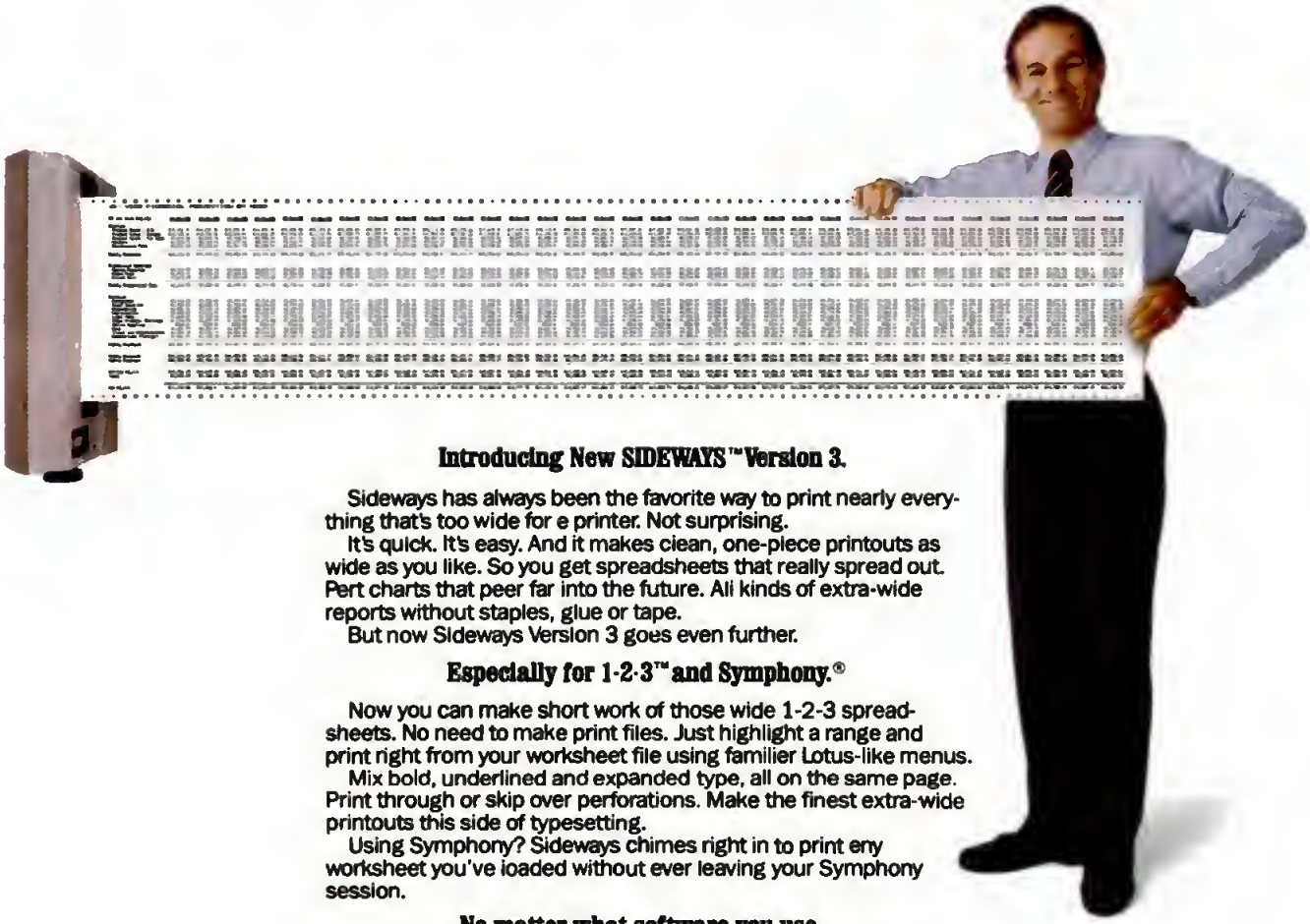
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Computers and Apartheid

The computer industry must examine its role in South Africa and confront the issue of moral responsibility not only there but wherever computers are used by dictatorships to suppress people.

A South African black is a prisoner in his own country, with about as many rights as an illegal alien on a California farm. Forbidden to live where he wishes, his very freedom of movement is restricted and monitored, and he needs the authorities' permission to live and work outside any of the phony rural homelands set up by the white regime in Pretoria. He (or she) must carry an internal passport, or passbook, wherever he goes, and he isn't even eligible for a South African passport if he wants to travel abroad; he gets a simple travel document instead. Such is life for blacks in the land of apartheid.

There are many weapons in the arsenal of apartheid, but the computer is, sad to say, unquestionably one of the most important of them. It is computers that keep track of the movements of every black, Asian, and colored in that tortured country; computers that store and correlate information on the dissidents who are hunted down and jailed (and sometimes murdered) by the military and police; computers that help Pretoria rule the country and maintain its grip over a seething population. Of course, the automation of apartheid is only a subset of the automation of repression throughout the world, for you'll also find computers on the desks of the jailers in Poland, Libya, Korea, the Philippines, the Soviet Union, and all too many other countries.

American Firms Involved

Most of the South African computer market is in American hands. Almost all of our big computer companies have South African subsidiaries, and many of our smaller firms sell their wares there as well, through import-export agencies. IBM, Burroughs, and NCR have the largest operations in South Africa—IBM employs about 1,800 people, Burroughs and NCR about 600 employees each—with Amdahl, Control Data, Hewlett-Packard, Mo-



Stan Augarten

hawk Data Sciences, Sperry, and Wang running smaller shops. Altogether, these companies employ about 4,000 workers, of whom approximately 750, or almost 20 percent, are black, Asian, or colored. Their annual sales range from $350 to $500 million, a great deal of money by South African standards but only a fraction of the companies' international revenues. (The figures cited above pertain to 1983, and were gathered by the Investor Responsibility Research Center, a nonprofit group based in Washington, D.C.)

There are two aspects to the computer industry's operations in South Africa. On one side is the sale of computers and related equipment to the South African government, particularly the security agencies; on the other is the industry's treatment of its black, Asian, and colored employees and its relations with South African society in general.

In 1978 President Carter banned the sale of all U.S. goods, including computers, to South Africa's military and police. But the prohibition came too late; by that time, Pretoria already owned hundreds of computers and software packages. (Information on the government's computer systems is hard to come by, though not entirely unavailable; for instance, the Department of the Interior, which maintains a registry of the population and helps administer the passbook system, owns two IBM mainframes.) Seeing the handwriting on the wall, Pretoria undoubtedly began buying more computers from other nations, such as Great Britain. In 1982 President Reagan lifted Carter's embargo and permitted the sale of computers that played only a minor role in police and military functions—a loophole that left the door open to the IBM PC and other low-level machines. Under intense pressure from Congress and the public, Reagan recently reversed himself, issuing an order that bars the sale of all computers to South Africa's security agencies. Of course, Pretoria probably has all the computers it needs by now, and you can be sure that many of them are American.

Code of Conduct

In 1977, the year before Carter's ban went into effect, a potent and persuasive opponent of apartheid entered the controversy. Leon H. Sullivan, an influential

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Baptist minister from Philadelphia and a member of the board of directors of General Motors, drew up a code of conduct for American corporations in South Africa. The Sullivan principles called for, among other things, integrated workplaces, equal pay for equal work for all employees, on- and off-the-job training programs, and charitable works in the community at large. (But the principles don't say a word about selling American goods to the South African government.) Twelve companies, including IBM, acceded to the code that year, and about 150 others have signed on

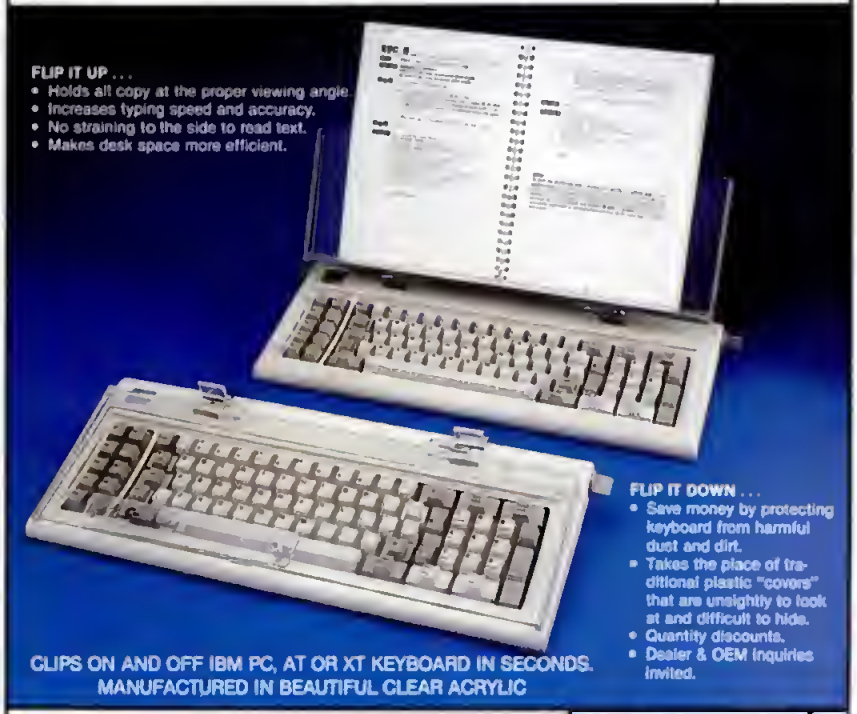
> It's not the conduct of the American companies in South Africa that most critics object to. Rather, it is the sale of computers to the country's security agencies that disturbs them.

since then. Every American computer manufacturer with subsidiaries in South Africa, with the sole exception of Mohawk Data Sciences of Parsippany, New Jersey, has announced its allegiance to the Sullivan principles.

A consulting company in Cambridge, Massachusetts, Arthur D. Little Inc., monitors the implementation of the principles on behalf of the signatories. Little has consistently given the U.S. computer industry high marks. Five companies—Burroughs, Control Data, Hewlett-Packard, IBM, and Sperry—have earned the highest possible ratings every year since 1981, with only two exceptions (Control Data and Hewlett-Packard received slightly lower marks in 1982 and 1983, respectively). NCR has the worst record of the lot, regularly getting a lackluster rating that is Little's equivalent of a C. Amdahl and Wang, which have relatively small operations in South Africa, signed the principles only this year and have not yet been rated.

In general, the industry has made extensive and expensive efforts to meet their obligations. IBM's performance has been particularly praiseworthy. Even though

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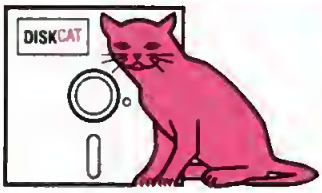
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the Sullivan principles don't restrict business deals with the South African government, IBM decided to take a stand on the matter in 1977. "It is IBM's policy," a company publication declares, "not to bid for business anywhere in the world where it believes its equipment would be used for repressive purposes, and we know of no case where it is so used." But IBM isn't naive. "However, it would be misleading to suggest that any manufacturer can control how its products are used." Almost anyone determined to own an IBM computer, no matter how large, can get one from someone, somewhere.

Few Black Managers

Of course, IBM is far from perfect. Although the number of black professionals and sales and systems engineers on its South African payroll has increased substantially, there are still very few blacks and other nonwhites in the ranks of management, which remain a white bastion. Assuming that IBM continues to adhere to the Sullivan principles, that inequity will probably disappear gradually over time, as the black engineers, accountants, and other professionals that IBM has recruited under the code begin to move up the corporate ladder.

But it's not the conduct of IBM and the other American companies in South Africa that most critics object to, although there are many people who would rather not see any American commercial involvement in South Africa, regardless of how many blacks lose their jobs. Rather, it's the sale of computers to the country's security agencies that disturbs them. Despite Reagan's ban, the issue is hardly a dead letter. IBM's refusal to sell equipment that might be used for repressive purposes is quite commendable, but in the real world the line between the repressive and the nonrepressive can be as thin as a hair. Apartheid is the official policy of South Africa, and in one way or another every nook and cranny of the government administers and enforces it. Those IBM mainframes in the Interior Department may not play a direct role in the passbook system, yet they're an integral part of the government agency that administers that hated program. Unfortunately, the bottom line is that it's probably impossible to do business with Pretoria

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All American computer companies should refrain from doing any business with the South African government. Something far more important than money is at stake at the tip of Africa.

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Note: If you'd like to read more about the computer industry's involvement in South Africa, the American Friends Service Committee publishes a fascinating little book on the subject. It's called Automating Apartheid: U.S. Computer Exports to South Africa and the Arms Embargo *(1982; reprinted 1984). It costs $4.00, including postage and handling. American Friends Service Committee, 1501 Cherry Street, Philadelphia, PA 19102.*

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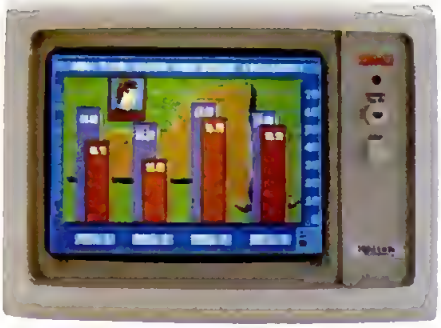


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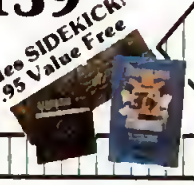
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LIGHTNING STRIKES

Borland International has earned a reputation for shaking up the industry with high-quality, low-priced business software. The company's new information retrieval utilities promise to stun the marketplace.

Every so often something happens in the PC marketplace that grabs you by the shoulders, stops you in your tracks. Gives you a sudden shivery stark perspective. In this age of incremental microcomputer advances, such chilling moments are rare. Editor Bill Machrone experienced one recently when he turned to a page in *PC Magazine* advertising nine 64K RAM chips for $4. I watched the frisson shudder slowly down from his brow. "Why the long face, Machrone? Because the same chips cost $50 last year?"

"No. Because I remember paying $600 for 16K less than a decade ago. And wondering what I could possibly do with all that memory at my fingertips." Machrone made a small sound like a tire going flat. I watched thoughts of mortality sputter behind his eyes. Another few of his hairs frosted into gray as he stared into space. "They charge anything less and they might as well grind them back into sand."

I just had my own computer *coup de foudre*. My neck is still tingly, and I had to reel my tongue back into my head. It happened in a modest Scotts Valley, California office. Philippe Kahn, Borland International's burly, unprepossessing, rumpled wunderkind, is hunched over his AT, punching intently at the keyboard and muttering to himself in French-tinged English. The words leak from some odd cavity between his nose and throat. "Eets een heer somewhar." Machrone and executive editor Barry Owen and I inch forward in our seats.

He doesn't keep this new program on his hard disk. Too risky. Some prying news hound or industrial Mata Hari might clone it onto a floppy while Philippe was away for a minute, and once the word gets out, the computer business is changed forever. Philippe needs just a little more time before he tips his hand and paralyzes the industry. He works around the clock in a clandestine office several miles away that his staff refers to as "St. Elsewhere," carrying the one copy of the program with him on the empty passenger seat of his lightning-fast Porsche 928-S.

Something about this scene just doesn't seem right. First off, the guy—president of the country's fifth-largest software company—is wearing a loud Hawaiian shirt and saggy pastel pants. He looks like the mayor of a small French South Sea isle, except that his skin is overly pink from too many hours in front of a flickery screen. There's something soft and ectoplasmic about him, an image that's reinforced by his frequent ghostly arrivals and disappearances. He knows he can't be two places at once, but he tries. Philippe's clearly not wild about day-to-day company management chores; he prefers to spend most of his time whipping together an array of bold new products.

He smiles at us sheepishly, devilishly, sliding his glasses up the bridge of his nose with his typing finger to see our reaction as he shows off a few other programs nearing completion. A momentary distraction, but he's on a roll and he's beaming now, the proud papa of three or four unreleased language products that will stand the industry on its ear. He spins through these lesser demos in seconds, talking in a rapid, high-level shorthand.

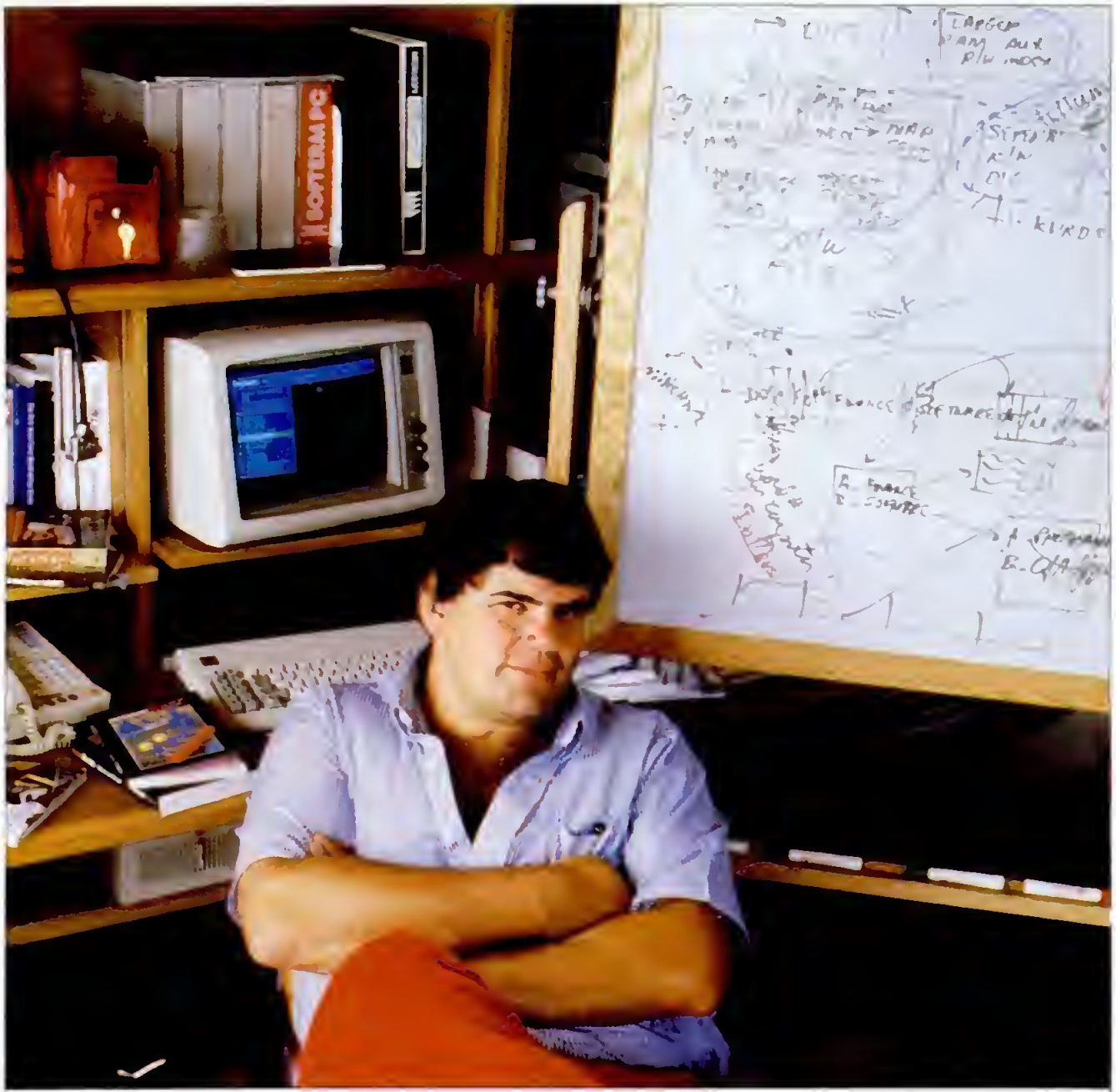
"Thees duz eet ten toms fester than Makrosuft. Thees nex wan mekes IBM's

Photograph: Dan Landweber

nyoo veerzhun louk lahk a keed's toy." Machrone and I stare at each other and wipe the drool off our chins. Philippe grins, prowling through a stack of mislabeled diskettes with one hand as he switches directories and flicks distractedly through astonishing demos with the other.

He brushes aside these flawless fist-sized programming gems, hunting for the one sparkler as big around as he. Which is formidable.

Machrone and Owen and I have flown 3,000 miles just to see "Daisy," the darling of the rumor mills, said to be everything from a foolproof DOS shell to a *1-2-3* killer to a multitasker, a memory manager, you name it. Philippe has already told us that the program is no longer named after the first song ever beeped out by an ancient mainframe, the melody warbled dirgelike by a lobotomized Hal in the movie *2001*.



At home with 33-year-old wunderkind Philippe Kahn, founder, president, and leading light of Borland International.

He's changed the code name to throw everyone off the scent. The new one? Philippe waits a few seconds to stretch out the tension. "Rambo." We all chuckle.

"Ah, maybee thees..." The A: drive scratches to life. "Yes..." He bounds up out of the chair over to the whiteboard, where he adjusts his galligaskins and begins sketching a few overlapping boxes. "Thees ees reely beeg." We can't tell from the diagram. The last person to leap out of his seat and over to a whiteboard for us was Bill Gates, chairman of Microsoft, and it was...well...really big. "Mehbee ahd bedder show you..." He glides back to his desk and taps five letters on the keyboard.

Rambo springs to life just like *Sidekick*, leaving a blue copyright box on a field of black. Except that this program churns away for a few seconds loading additional data files, and they're big, even for an AT.

CATCHING UP WITH PHILIPPE KAHN

The Paris-born, French-schooled founder of Borland International succeeds on the strength of his determination, energy, good product sense, and irrepressible joie de vivre.

"We never started this company with the intention of becoming millionaires in Silicon Valley," says Borland International founder Philippe Kahn. "We just wanted to have fun, and make products we believe in."

Doing exactly that, Kahn has become a wealthy man at 33, developing and selling software he—and hundreds of thousands of PC owners—fervently believe in.

By most estimates, Kahn's 2-1/2-year-old company ranks number five among PC software developers, after Lotus, Microsoft, Ashton-Tate, and MicroPro. And Borland got there without selling anything, until *Lightning*, that cost more than $84.95 list.

The Philippe Kahn story matches the intensity of other industry mavericks—Steve Jobs and Adam Osborne come to mind—if not quite the intense public scrutiny. He was named one of *PC Magazine*'s seven "Unsung Heroes" last spring (see "In Praise of Unsung Heroes," *PC Magazine*, volume 4 number 16, page 105). While he's unlikely to be seen in the "People" section of *Time* squiring Brooke Shields around Manhattan, Kahn maintains an unavoidably high profile within the industry, where he is well known for his husky figure draped in a blazer over a tropical print shirt and his thoughtful but often controversial pronouncements. *The Wall Street Journal* profiled him as "L'Enfant Terrible... L'Enfant Riche" in June of this year.

Philippe Kahn was born in Paris in 1952. At age 8 he was sent to a UNESCO school with students from around the world, including Americans, who helped him develop an impressive command of idiomatic English that surprises visitors today. During his college days, Kahn played saxophone in Paris jazz clubs while earning an *Agrégation de Mathématique*, equivalent to a Ph.D. in math. He taught university math in Nice and Grenoble, attempted to market software from Ireland (unsuccessfully), then came to the U.S. in 1982 with wife Martine, two daughters, $2,000 in his pocket, and a vision.

Earning His Wings

Borland was founded in May 1983 with $20,000 in family money, according to Borland, and its first product, *Turbo Pascal*, shipped that November. The Borland name? Kahn liked the ring of the name Frank Borman, and modified the Eastern Airlines chairman and former astronaut's last name so that there would be no confusion. *Et voilà:* Borland International.

The first product, a $69.95 *Turbo Pascal*, was shipped in November 1983 to an audience uncertain about the need for *Pascal* and wary of low-budget languages after the $29.95 JRT *Pascal* fiasco, in which customers waited months for another company's program that didn't run very well once they got it.

By early 1984 favorable reviews and good word of mouth set *Turbo Pascal* apart from the competition. Borland unleashed *Sidekick* in June 1984, and it too became an immediate hit. Software distributors at first declined to carry *Sidekick*, but the powerful mail order response directly to Borland brought the distributors around. Today, *Sidekick* is the top-selling utility program for PCs.

Borland has grown from a 4-person company at its founding to 140 today, but Kahn still wants to think small at the development and pricing ends and big only at the volume end. He says that only 5 people were directly involved in writing code for *Lightning*, which is, to Kahn's mind, as big as a development team ought to be.

Philippe Kahn is not without his critics. A former marketing officer at Borland, Alex Morton, who now runs Amber Systems and markets a *Sidekick* competitor called *Homebase*, says Kahn's ego is immense and that it sometimes leads Kahn to take credit for work more properly shared with others. On the subject of *Lightning*, however, Kahn did not hesitate to credit other members of the development team. According to Kahn, Lars Nielson specialized in windows management, Barry Mead concentrated on spelling algorithms, Gary Davis tended data compression, and Jerry Seagraves teamed up with Kahn himself to oversee product design.

Kahn insists that he's in it for the fun, not for the money or the chance to be number one. "We're not interested in competing with Ashton-Tate or Lotus, just in bringing out good products. Competing is not a goal; it's just something that happens. We're not interested in big, bloody wars."

But, warns Kahn, "If anyone sets up a company whose only goal is to go after Borland, they're not going to get anywhere."—**Bill Howard**

Philippe starts typing. We hear a faint insistent beep. Then another. What's happening? It's catching misspelled words on the fly. Rambo is an on-line real-time spelling checker? Well, yes and no. He positions the cursor on a word and hits a "hot key." A small pop-up box springs onto the screen, crowded with synonyms. Rambo is a thesaurus? Well, yes and no.

First off, Rambo is really *Lightning*. An appropriate name. The full title is actually *Turbo Lightning*, and it may be packaged together with several large databases as the *Turbo Lightning Library*, but the industry will probably elide it to just plain *Lightning*. Like the other thoroughbreds in Borland's stable, *Lightning* is memory-resident, non-copy-protected, and a snappy performer, but this program seems to do so much so fast.... And it's far more than just a souped-up version of *Word Proof*. *Lightning* is nothing less than the way we'll all be working in the very near future. Scorchingly speedy and with limitless resources at our fingertips.

Philippe gestures at a stack of reference books behind him, and suddenly we understand his penchant for secrecy. He has perfected a system for retrieving prodigious masses of data instantly, effortlessly —at the touch of a key. But first he has to scramble to lock up the electronic rights to the world's most popular reference works before their publishers realize what he's doing and jack up the prices. And this country's publishing panjandrums are not exactly famous for their largesse.

This is when I experienced my own giddy moment of silicon satori. In a gauzy blur I was back at the IBM product center in early 1982 kicking the tires of a strange beige appliance with 16K of memory standard and single-sided disk drives and an alien keyboard, listening to the salesman tell me that if I ordered one on the spot it would take three months to arrive.

As I watched the IBM salesman wrestle with *EasyWriter 1.0*, I instantly understood how a computer could revolutionize my life. I was buying the PC as a writing tool; never again, I told myself, would I have to crowd my desk with dictionaries, atlases, encyclopediae, quotation anthologies, and other ponderous, hard-to-juggle reference works. The computer would manage all this knowledge for me, fetch leagues of facts, comb through miles of tiny type for the exact word, the correct historical date, the most obscure minutiae, down to the last precise utterance, all in a flash and with dead accuracy. Never again would a misspelled or mistyped word blot a manuscript of mine; the computer would bounce it instantly like a slug in a turnstile. It was a real kick in the shins when I finally cabled the boxes together and realized how utterly crude and incapable all existing software was. And the situation hasn't changed a whit. While *1-2-3* may be powerful, and a sufficiently customized *WordStar* can commit your thoughts to magnetic posterity, today's software operates solely by brute force.

But now, nearly four years later, we have a software package confected to work by finesse. Certain indexes reside in memory and are linked by electronic filigree to others; operation is smooth and submerged. You don't know it's there and don't have to. Someone really thought this one out. Boxes pop out of the ether when they should, prompting you to act with a minimum of effort and obtrusiveness. You can bend the underlying mechanism to your whim and can perform the necessary magic using a variety of different command structures to suit your tastes. And it's all... lightning quick.

What makes *Lightning* especially interesting today is the profusion of fleet fixed disks and other mass storage devices exploding onto the market. The standard 20- and 30-megabyte AT Winchesters crank at a dizzying 40-millisecond access time, and *PC Magazine* is currently testing far bigger and faster mass media. One dreadnaught we've seen can massage 100 megs at a frenetic 17 milliseconds; this is like having your thoughts appear onscreen before you think them. And our technical editor Craig Stark is in gigabyte heaven with a new generation of optical WORM (Write Once Read Many) disks that can salt away 200 million words. If you were able to store one word per second on it nonstop around the clock, six years later you'd still have space to spare.

But *Lightning* isn't just for writers. If you're a lawyer you can have every critical precedent on-line, poised in the background ready to buttress a brief at the touch of a key. A doctor enmeshed in an accounts receivable summary can check on an emergency drug interaction or patient history. A designer can retrieve crucial technical specs while deep inside a CAD package. An accountant could unearth an old tax return while updating a related spreadsheet. Businessmen could obtain the details on every black dollar or red cent. What Borland has done is make whole libraries of knowledge instantly and easily accessible.



Une petite ville in central France? Borland president Philippe Kahn refuses to reveal the location of his company's "St. Elsewhere," the development site of Turbo Lightning.

Fast Facts

Lightning does exact a price, chewing up a few dozen K of memory and dragging its foot slightly while it watches you type.



Lightning is nothing less than the way we'll all be working in the very near future. Scorchingly speedy and with limitless resources at our fingertips.

But memory is so cheap it's nearly free, and most users don't begin to exploit all their RAM. The exhilaration of plucking facts so fast and with such impunity compensates for the slight stutter-step in application speed.

For years science writers have been slinging clichés about how the power of a modern mainframe doesn't measure up to even the nervous system of a gnat. Borland has just changed all that. Now even a tired old PC-I with an inexpensive hard disk attached can plumb vast volumes of data and dredge up the precise fact you're seeking almost instantly.

This isn't going to put the database business out of business. Companies will still need to enter daily receipts, inventory adjustments, personnel changes. But conventional database managers are often cantankerous, rigid, and slow. And they run in the foreground only. To look something up, you have to stop what you're doing, load the database program, find the proper data file and load it, then either enter an unforgiving series of thorny commands or slog through a succession of tedious menus. Finally, you have to copy the information to the application for which you needed it in the first place, which is not always a trivial task.

(Borland obviously still believes in conventional databases. In late September the company acquired Analytica, a start-up software manufacturer, and will sell that company's highly regarded $495 *Reflex* database manager for under $100. In addition, Borland will put the finishing touches on a slate of other "business productivity tools" currently being developed by Analytica. Kahn considers the acquisition significant because it lets him introduce a new product at an aggressive price—and adds half a dozen high-powered programmers to his development team.)

Setting the Standard

Lightning combines advanced data compression techniques with Borland's trademark memory residence and its intuitive user interface to retrieve fathomless oceans of facts painlessly and in the flick of an eyelash. The software is studded with intelligence and good design. And because it lurks in the background waiting for you to send its indexes spinning into action, you can call it up when you need it most—from within other applications.

Users everywhere can ride *Lightning* to a wealth of general-interest information. You'll never again have to pore over a zip code directory or riffle through your well-thumbed dictionary to check on a nuance of meaning or consult an encyclopedia. And you can perform this magic while using your computer for other more complex chores.

Borland plans to make the *Lightning* compiler publicly available so that users can feed in their own indexed storehouses of data. And the company is going to market a whole shelf of standard reference works, including *Roget's International Thesaurus, Bartlett's Familiar Quotations, Black's Dictionary of Law, Steadman's Dictionary of Medical Terms,* the *Columbia Encyclopedia,* several prominent foreign language translation dictionaries, and other even better-known works currently under negotiation. Borland will either sell these directly or license *Lightning* to outside reference book publishers; Philippe claims he'll do "whatever it takes to make *Lightning* the standard knowledge retrieval system."

Lightning will undoubtedly accelerate the growth of the mass storage hardware market. It will send every serious floppy-bound user scurrying to snap up a high-capacity hard disk, and should also spur the market for optical disks. A single gigabyte laser disk could easily hold 20 major reference books. As Philippe puts it, with the proper optical disk, *Lightning* will give you "everything from *a* to *y*—the almanac to the yellow pages."

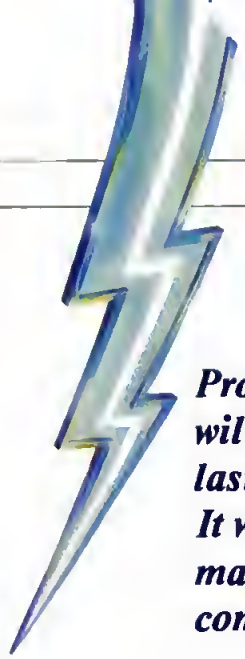
In fact, one of Borland's initial ready-to-run reference disks will be a national business yellow pages. Philippe points out that since each call to AT&T's directory-assistance operators now costs 50 cents, a bundled *Lightning* and electronic yellow pages package should pay for itself in a year or less. And Borland will provide periodic updates for the yellow pages and other time-sensitive reference tools to keep them current.

To demonstrate the versatility of the retrieval kernel, Borland has even put together an entertainment software package called *Lightning Word Games,* which includes a Boggle-type puzzle, a crossword program, and a code breaker that analyzes letter frequencies in normal text. These games are all based on existing Borland source code and demonstrate how the *Lightning* technology can easily be adapted for general applications development.

90 Percent Perspiration

In a calmer moment, Philippe slowly sheds his slight accent and sinks into his chair as he talks about *Lightning*'s early days. The idea for *Lightning* dates back to when he first started using a personal computer. Each time he had to look something up in a book he remembers screaming, "The computer should be doing this for me, dammit!" Work on the project began in early 1985 and accelerated during the Borland *SuperKey* development program.

Philippe admits, "It's easy to have a great idea; it's another thing to make it work. And *Lightning* in one form or another is an idea that probably everybody has had." At the start, Borland programmers had doubts whether they could pull it off, but the seamless development of *Sidekick* and *SuperKey* encouraged them—and



Properly implemented, Lightning will sell computer hardware; the last product to do that was 1-2-3. It will revitalize a lethargic market and create legions of new computer users.

provided many of the critical programming tools they needed to nail it down.

The major breakthrough occurred late one May night in the basement of Philippe's home when his programming team first connected the user interface to the lookup engine. The experiment worked without a hitch. But it took several months to polish the program's operation so that it could perform such complex tasks as handling programs with bit-mapped displays or feeding information back into ill-behaved applications. *Lightning* will work with virtually every software package on the market that doesn't steal keyboard interrupts.

Work on the project was momentarily interrupted halfway through development when Philippe learned that the publishing house Grolier and computer pioneer Gary Kildall were about to announce a full-text encyclopedia on an optical disk. Borland's programmers were justifiably concerned until they learned it was a standalone nonresident product. "We were scared when we first heard about it," recalls Philippe, "but it turned out to be poorly implemented. There was a significant technological gap between us and them."

Less is More

Will success spoil Borland? Philippe doesn't think so. "While we're only human, there's something different about this operation. I never started a company to be a millionaire in the Silicon Valley sense. We do it because we like the products we make. What will spoil it for us is not having fun doing it any more." Friends in the industry tell him he had better gird himself for change, since Borland is on the verge of becoming a very different company. Several months ago Borland had only 60 employees. The number is now 140 and climbing. Fast.

Philippe understands the problems, and is trying hard to maintain the inventive, hard-driving but informal atmosphere that rocketed the company in record time to its lofty perch on the best-seller charts. "Success is good for people. But you can't let it change the basic way you operate. Good software is not created by committee; it's done by a small number of people. This has always been the case. *WordStar* was written by one guy, Rob Barnaby. *VisiCalc* was done by two people, Bob Frankston and Dan Bricklin. So was the first real BASIC interpreter—by Paul Allen and Bill Gates."

Big programming committees and enormous budgets are the wrong way to produce top-quality products, according to Philippe. "Look at *Reflex*, which was funded by venture capitalists. They spent $8.8 million in 3 years. The product was done by four or five people—including designers, maybe six total. How could they have spent so much money? People who don't know anything were just fooling around and wasting money. With Lotus's *1-2-3* there were really two or three guys involved. With *Symphony* there were 50, with *Jazz* maybe 70. Draw your own conclusions." Philippe admits that if he had to pick a model for a burgeoning Borland, it would be Microsoft rather than Lotus.

He may need to staunch such growing pains sooner than he thinks. Philippe wants to make *Lightning* so popular that users will think of it "almost as part of their operating systems, like COPY or CHKDSK," and from early indications he's well on the way. "We're putting the whole world of information at your fingertips, no matter what program you're running, all of it instantly accessible. It will dramatically change the way you work. Borland employees who have used the early versions of the spelling checker and thesaurus already can't live without them, and these trivial applications only begin to scratch the surface."

Since he started producing software in 1983, Philippe Kahn has fielded an unbroken string of winners, and *Lightning* looks as if it may top them all. It fills a fundamental need, and, like all other Borland products, does it elegantly, intelligently, and affordably. When combined with *Sidekick* and *SuperKey*, *Lightning* provides an extremely powerful array of interlocking tools that will help users work with unparalleled efficiency and speed. Other dazzling software products we've seen on the Borland drawing boards will rack up notable successes, but none in the near future will match *Lightning*'s impact. Properly implemented, *Lightning* will sell computer hardware; the last product to do that was *1-2-3*. It will revitalize a lethargic market and create legions of new computer users.

Each year the microcomputer industry spawns hundreds of clanky, balky, ill-conceived, badly designed, overpriced, copy-protected software packages, most of which are answers for which there were no questions. This applications midden is one big reason computers aren't selling well these days; the market of patient, intelligent users who are willing to put up with mediocre software is saturated. *Lightning* may change all this by yoking the existing hardware's powerful mass storage abilities to a sleek rapid-retrieval system that anyone can use, especially with the current proliferation of affordable hard disks and the promise of fat fast laser disks.

Philippe Kahn made believers out of skeptics who snickered when he introduced an inexpensive Pascal compiler and a memory-resident set of desktop utilities to an already glutted market. With sales of this first round of products nearing three-quarters of a million units, the laughter has subsided. And now Philippe has followed this success with one even greater. *Lightning* has clearly struck twice, this time with an electrifying thunderbolt. ■



THE SPARK OF LIGHTNING

Borland International sets the marketplace on its ear once again with an inexpensive product that makes the PC more productive for everyone, and may just bring PCs to a whole new class of users.

Turbo Lightning is a spelling checker. *Lightning* is a thesaurus. *Lightning* is an encyclopedia. *Lightning* is instant access to any data that can be indexed or organized by words. *Lightning* is a revolution in the making. And "revolution" is a word *PC Magazine* has scrupulously tried to avoid for two years.

The lowest common denominator is that *Lightning* gives every program you use full spelling-checking and thesaurus/synonym capabilities. Given the abysmal state of spelling and word usage in today's business communications, that's good news indeed. *Lightning* replaces incorrectly spelled words or synonyms at a keypress, making it easy and fun to use.

On the face of it, there's nothing revolutionary about a memory-resident spelling checker or a memory-resident thesaurus. Indeed, if that's all that *Lightning* were, it wouldn't be very exciting. But *Lightning* is the future. It speaks to every important growth area of personal computing: productivity, networking, optical storage, and new markets.

As its name implies, *Lightning* is fast. In its most mundane form, it sits in memory and watches everything you do. If you type a word that its small, memory-resident dictionary doesn't recognize, it gives you a discreet beep. If you don't recognize your error, just press the gray minus key to invoke the full 130,000 word dictionary from disk. An Alt key calls upon a thesaurus with 5,000 root words and 90,000 synonyms. That's just the beginning of the Borland magic. When you see the correctly spelled word or the synonym you want, a single keypress deletes the unwanted word and inserts the one you've targeted. *Lightning* is configurable to virtually any program you're likely to use.

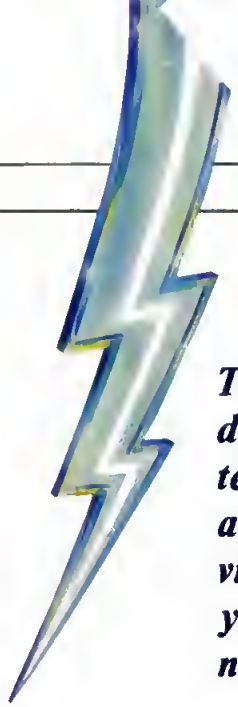
The dictionary and thesaurus are from Random House. They come standard with Lightning at $99.95. For an additional fee,

PC FACT FILE

Turbo Lightning Library
Borland International
4585 Scotts Valley Drive
Scotts Valley, CA 95066
(408) 438-8400
List Price: Turbo Lightning (standard package includes Lightning lookup engine, Random House Spelling Checker and Thesaurus), $99.95; Roget's Thesaurus, $99.95; encyclopedia module, $99.95; Lightning Word Games (including Turbo Pascal source code and a Lightning applications technical manual), $69.95.
Requires: 384K RAM, DOS 2.1 or later, hard disk recommended.

CIRCLE 635 ON READER SERVICE CARD

In PC News This Issue
Borland Acquires Analytica: Slashes Price on Reflex Database by 80 Percent



The possibilities are endless: dictionaries of profession-specific terms, product guides, article abstracts, engineering tables; virtually every reference work that you may have next to your PC can now be in your PC.

you can get the complete *Roget's International Thesaurus*, fully compressed, in *Lightning*-readable format. Other reference works, such as the *Columbia Encyclopedia*, will also be available, although prices had not been determined at press time.

The real excitement of *Lightning* is its open-endedness. While the program uses all the latest techniques of data compression and pattern recognition, Borland will also offer a "compiler" that builds data files from indexed text. The possibilities are endless: dictionaries of profession-specific terms, product guides, article abstracts, engineering tables; virtually every reference work that you may have next to your PC can now be *in* your PC.

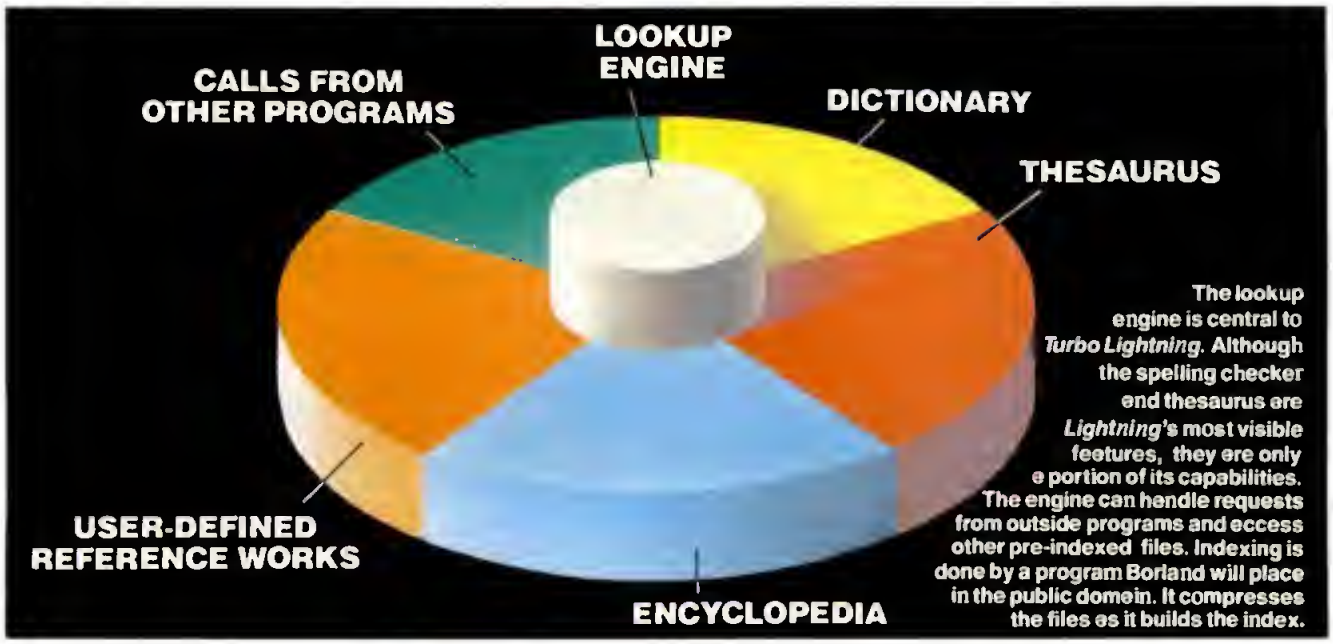
Tie-ins to optical storage and networking are obvious. The full text of newspapers, magazines, and reference works can be centrally located on an optical file server. By creating your own dictionary, you can turn *Lightning* into an on-line syntax checker for programmers, complete with on-line manual, examples, and technical references.

Lightning in Action

Lightning can be configured to work with virtually any word processor, spreadsheet, or database. Its menus are very similar to those of Borland's *SuperKey* keyboard enhancer. In fact, it shares *SuperKey*'s screen interface code. The Environment option allows you to select among many popular products or design your own custom interfaces. Any of the predefined product setups can be modified to suit your specific hardware and software environment. *Lightning* automatically senses when *Sidekick* is active and reconfigures itself accordingly. This can be handy if you use the notepad frequently, especially as a window into other applications or files. *Lightning* also senses when you are in DOS. You can add commonly used DOS commands to the dictionary so that the program doesn't beep at you when you type things like CD and DIR, or you can configure *Lightning* so that autoproof is off when DOS is active.

The configuration options within the Environment menu are exhaustively complete. You can tell *Lightning* whether to get its characters from the screen or the keyboard, so that bit-mapped applications work just as well as character-based programs. You can teach it how to tell when a product goes in and out of insert mode, again from the screen or the keyboard. As you might expect, *Lightning* understands full path names, so it can find its reference files on the drives and subdirectories of your choice. If you don't tell it where they are, it will look for them in the directory from which it was started.

You can also initiate spelling checks and thesaurus lookups from the main



The lookup engine is central to *Turbo Lightning*. Although the spelling checker and thesaurus are *Lightning*'s most visible features, they are only a portion of its capabilities. The engine can handle requests from outside programs and access other pre-indexed files. Indexing is done by a program Borland will place in the public domain. It compresses the files as it builds the index.

menu, but most of the time you'll use the the hot key or Alt-key combinations you've defined to invoke them. This practice is consistent with *SuperKey*, where you can be guided by the menus or go direct to the function you want. Also like *SuperKey*, you can reassign any key to invoke *Lightning*'s functions. The pre-release version was shipped, for example, with the gray Plus key (on the numeric pad) as the trigger for *Lightning*'s main menu. The gray Minus key did the deep dictionary probe, and the Alt-7 key called up the thesaurus. Once I had configured the program, I seldom needed to go into the main menu, so I put it on Alt-0, the thesaurus on gray Minus, and spelling checks on gray Plus. This gives me fumble-free access to its two most important features for writing.

There are two other functions you can invoke with Alt keys: checking the entire screen for misspellings and moving the cursor to last misspelled word. These are handy for proofing documents that you didn't create with *Lightning* active, but they offer no real advantage over other proofing packages, such as *The Word Plus* or *Word Proof*. *Lightning*'s forte is its memory-resident, on-the-fly information access and spelling correction.

Lightning also has context-sensitive help, much like *Sidekick*'s. That, coupled with the program's inherent simplicity, means you won't have much need for the manual.

How Lightning Works

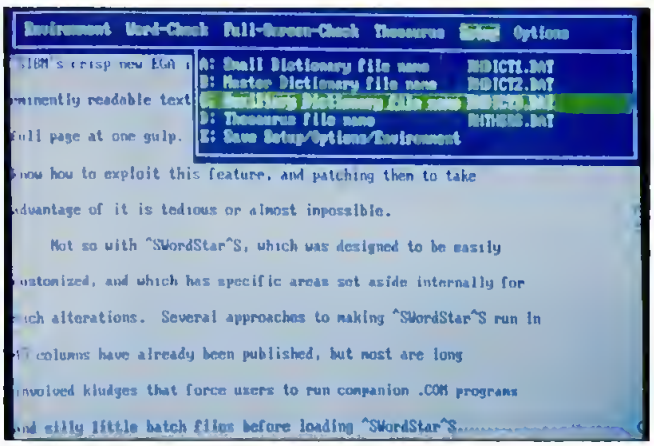
As you might expect, *Lightning* embodies sophisticated data compression schemes. The word list is subjected to character frequency analysis, and the most common letters and combinations are replaced by shorter bit patterns. The program also puts the most common suffixes, likewise compressed, into a table. Within the table the most common groups of suffixes are reduced to small bit patterns. Several words can actually be represented with the same code. In an alphabetically sorted dictionary, most words have several letters in common with the previous word. *Lightning* takes advantage of this by storing only the word-to-word changes, not the common characters.

Lightning's memory buffers act as a thumb-index into the dictionary. The first letter steers the search into the major area, and the next few characters refine the search to a very small, specific area of the dictionary. In this way *Lightning* has no trouble keeping up with the fastest keyboarding.

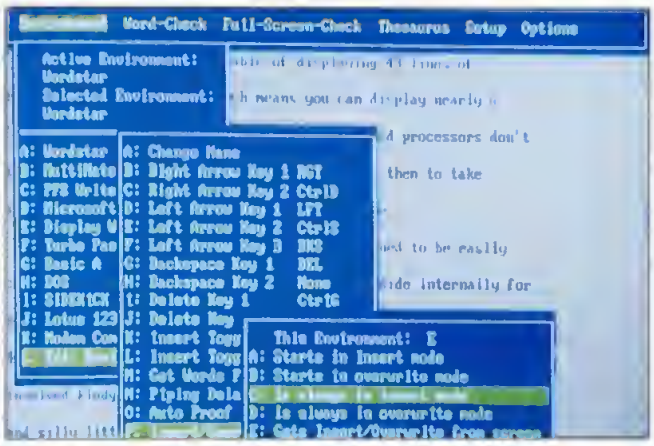
All that speed would be for naught if *Lightning* couldn't communicate with popular programs. But within lurks a programming tour de force, centered around an 80-character circular buffer. *Lightning*, of course, modifies the keyboard interrupt, scanning each character, working its way down through the index, into the dictionary as it sees each character you type. Borland couldn't use the PC's built-in keyboard buffer because many applications programs flush it under a variety of conditions, none of which are helpful to *Lightning*.

The setup option allows you to specify whether the buffer is fed from the screen or the keyboard. The former is fast; it's a memory-to-memory transfer, and the program monitors the screen for other information, such as whether the application is in insert mode. The latter is important if the application is bit-mapped, such as *Microsoft Word*. It's too difficult to figure out what each character is from the bit image, so the program takes them from the keyboard. Getting the corrected words into the application program takes some legerdemain as well. *Lightning* is capable of learning everything it needs to know about how an application moves the cursor, controls insert, backspacing, and character deletion. The program convinces the application that you in fact deleted the offending word and entered the correct one.

Even with all of *Lightning*'s clever programming, though, there are a few environments in which it can't work. *XyWrite*,



Lightning is a non-copy-protected, memory-resident product, configurable to virtually any application program, that looks up data in specially indexed and compressed files. It can function as a real-time spelling checker/corrector, or an on-line thesaurus, or as an entry to reference works such as encyclopedias. Its files can be located on RAM disks or fast Winchester disks for speed, or public network drives for sharing. The user can determine which of several dictionaries is to be resident.



You can modify the way _Lightning_ treats the screen and keyboard for each application in its repertoire. _Lightning_ automatically senses when it is in DOS and when _Sidekick_ is active. This feature is necessary when switching contexts, such as when applications are interrupted by _Sidekick_, or when you use an application's DOS exit capabilities. The choice of keyboard or screen as the source of characters is important to proper operation with programs that use a bit-mapped screen.

I'm sorry to say, is one of those renegade programs that steals the keyboard interrupt and doesn't give it back. Many a program modifies the keyboard interrupt by adding its routines to the list of those to be performed, but *XyWrite* isn't so polite. Everyone from me to Philippe Kahn to vice presidents at Microsoft have called Dave Erickson at XyQuest to urge him to change this. He will in a future version.

WordStar has a different problem. It was designed back in the bad old days when CP/M machines could devote all their processing resources to tasks like seeing if the user were pressing a key. This is called "keyboard polling," and it's exactly what *WordStar* does, thousands of times per second. The PC really wants programs to use the keyboard interrupt, rather than poll. The constant checking invokes *Lightning*'s routines each time, and the net effect is that *WordStar* slows down. This is actually an old problem, one that MicroPro solved for the CP/M operating system years ago. The PC, however, requires a different solution. You won't notice the difference on a PC AT or any of the faster machines, but it becomes irritating on a standard PC or XT. Programmers are working on the solution even as I write this. The cure is a patch to *WordStar*, not a modification to *Lightning*.

Lightning comes with four versions of the *Random House Dictionary*. The largest has 130,000 words and the smallest has 10,000. The installation program lets you specify which one will become RAM-resident. The 10,000-word dictionary is enough for most applications, because all probes and full-screen checks always go to the master dictionary whether it is on disk or in RAM. Also, Borland says that 90 percent of commonly used English words are in the small dictionary.

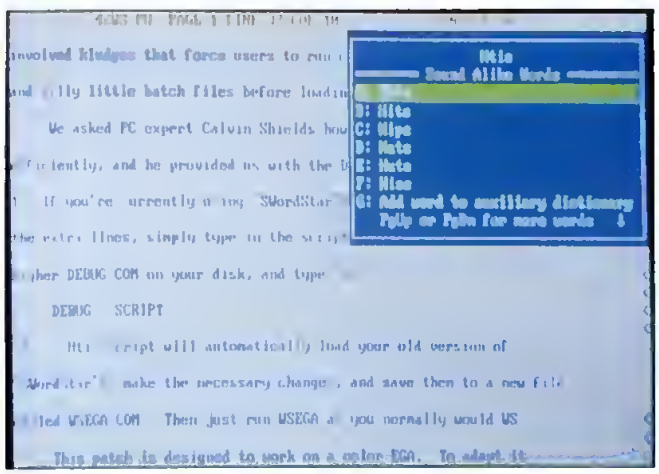
Computer Dyslexia

Many spelling-correction programs can't find the right word if you get the first letter wrong. *Lightning* overcomes this limitation with a built-in table of commonly inverted words, compressed, of course, to their smallest form. So when you type *fo* or *hte*, *Lightning* beeps and suggests *of* or *the* among the words you really meant. Of course, there are limits to the number of inverted words the program can store: *Olve* gets you *olive* not *love*.

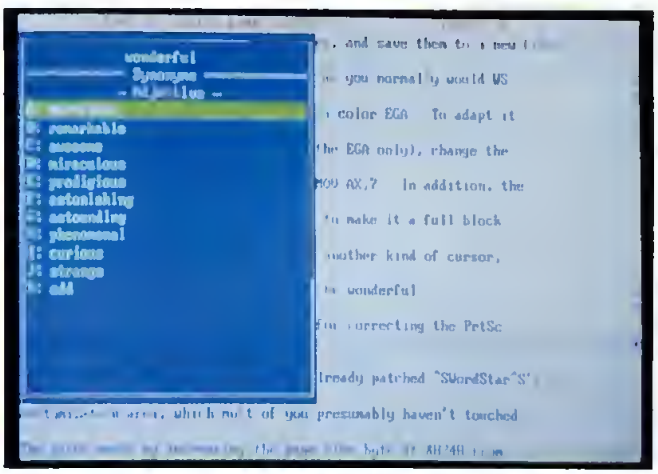
After the inversion check, *Lightning* looks at every word in the dictionary that has the same first letter and the same length, a common practice among spelling checkers. Next it eliminates words that are not sufficiently similar from the candidate list. Then it looks at words that are highly similar but different in length. Finally, it arranges the words in the candidate list in the order of similarity and divides them into windowfuls for presentation. One of the options is to add a word that *Lightning* doesn't know to the list. The function is not as convenient to use as, say, *Word Proof*, but it can store case and capitalization information with the word, just the thing for names on memos and proper nouns.

The *Random House Thesaurus* is compressed in much the same way as the dictionary. The 5,000 root words are keys into the second level of 90,000 synonyms. Like a printed thesaurus, it doesn't contain all parts of speech in the list of root words. For example, it contains *hard* and *hardly* because the meanings are completely different. You won't, however, find *surely*. You'll have to look under *sure*, instead. You won't find *prattle* or *intransigent*, but you will find *scurrilous* and *opprobrious*. Interestingly, *scurrilous* will get you *opprobrious* in the synonym list, but the opposite isn't true.

Lightning helps you by using the same approximation algorithms as the spelling checker to display thesaurus words that it thinks are close to the one you want. Then a keypress displays the synonyms to the word in question. If you just want to look at the word list, you can get back to the application program by pressing the Escape key.



***Lightning* beeped when the last word in the text paragraph was typed. It is sensitive to capitalization; if the word had not been capitalized, its spelling suggestions would not be capitalized. Note that the first suggested correction is the right one, since *Lightning* maintains a small dictionary of common first-pair inversions. Inversions within a word are handled through normal spelling-correction techniques, as long as you begin the word with the right letter.**



A keystroke initiates the thesaurus lookup. Pressing Enter will cause the word in the highlight bar to replace the word at the cursor. Alternatively, pressing the letter key next to another desired word will cause it to be substituted. With an average of 18 synonyms or related words per entry, the Page Up and Page Down keys display additional choices. *Lightning* groups the entries by part of speech. The thesaurus will also select words "close" to the one you choose.



Lightning's timing and features may be just perfect to dominate the emerging laser disk market: It's fast and relatively compact, and it has an impressive number of reference works already lined up.

Future Lightning

One of the many forthcoming *Lightning*-accessible reference works is the desktop *Columbia Encyclopedia.* With this kind of file *Lightning* returns an entire subject entry in a window instead of a list of words. For instance, if you typed in "England," you'd get its population, geographic data, and the political and historical information found in the encyclopedia.

In some respects *Lightning* is like the indexing utility that MS-DOS never had. Most operating systems worth their salt have a sort utility and an indexing/file access capability. *Lightning*'s "compiler" or indexing program builds records that can be accessed very quickly.

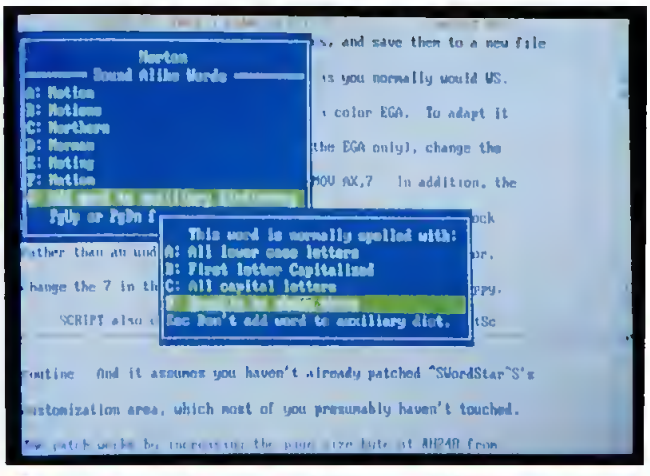
If *Lightning* were the only program that could do so, it wouldn't be so interesting. But *Lightning* has hooks, or entry points, that can be called by other programs. These programs can query the dictionary, the thesaurus, or any other file that's defined to *Lightning.* Borland calls this feature the "interface engine." It's flexible, in that it can verify the existence of an entry in the target file, return the unique number of the query word, or even return a range of words with the same first letter and length. If the external program calls the interface engine with a unique word number, the engine returns the target word. The engine works on external files as well as memory-resident ones.

When reference files get really big, as with laser disks, this capability is going to be much more important than it is at this moment. The last thing we'll need a year from now is a dozen or two incompatible indexing and retrieval methods, all clamoring for dominance in the gigabyte disk arena. *Lightning*'s timing and features may just be perfect to dominate the emerging laser disk market: It's fast and relatively compact, and it already has an impressive number of reference works lined up.

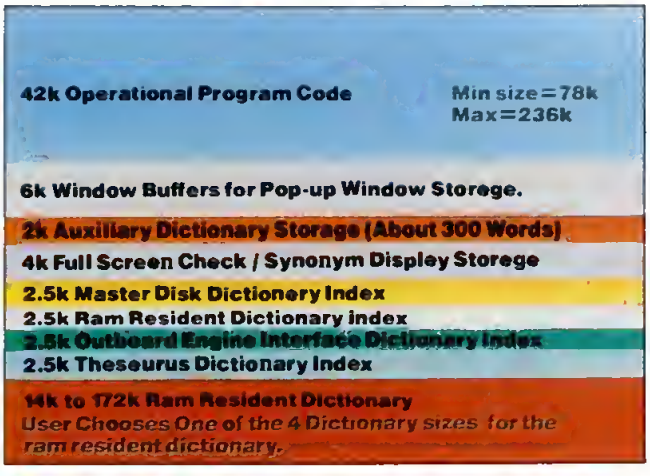
Lightning as configured today is an end-user product. Much can be done to make it more attractive to other software manufacturers, such as providing a version that works as a device driver (gaining further legitimacy by running inside DOS) or by providing a full-scale DOS 3.1 network version of *Lightning* that understands access levels, record locking, and passwords. It's entirely likely that not all users will be granted the same access privileges to large files.

Spreadsheets allowed number-oriented people to do things with personal computers that they could never do before. All the outliners, word processors, and other tools for word people never made the PC into the promised creativity machine it was supposed to be for word- and fact-oriented people.

Lightning, in a stroke of originality, has forever changed all that. ■



When words are added to the dictionary, *Lightning* wants to know whether the word is always capitalized, all capitals, or always lowercase. This is especially convenient for proper nouns, names, abbreviations, and acronyms. The additional dictionary is RAM resident so that it becomes part of the real-time spelling check. There is no noticeable difference in the checking speed of additional words as opposed to the ones in its regular dictionary.



Much of *Lightning*'s speed comes from its memory-intensive design. RAM-resident indexes function the same way as a thumb index on a dictionary. Spelling probes are started by pressing a user-defined hot key and go to the largest dictionary, whether it is in memory or on disk. The "outboard engine" allows *Lightning*'s files to be read by external programs. Files accessed by external programs can be in memory or on disk, making *Lightning* a generalized lookup utility.

9 LAPTOPS

Portable computers can pinch-hit for your desktop PC anytime and anywhere, whether you're at home or traveling on business. New, readable LCD or plasma screens and built-in disk drives make them even more practical.



TO GO

Americans have always had a love affair with mobility. We've made cars and freeways a way of life, and we like to take everything with us. Chances are that someone has designed a version of just about any tool or entertainment device you can think of for footloose citizens to drag along on their travels.

Computer manufacturers have also heeded this call of the road. Portable computers have evolved from esoteric curiosities to arm-stretching but still luggable miracles to notebook-size tools that are truly useful and portable.

PC Magazine takes a look at nine of the most interesting portable computers available on the market today. All are light enough to merit the name "portable," but some require an AC outlet to function. Most are MS-DOS machines that offer some degree of PC compatibility, while others are simply clever laptops that can be used as valuable extensions of more-powerful desktop personal computers.

As you read about these small wonders, keep in mind why you might need (or simply want) a portable of your own. Their uses are endless, but only you can determine which type of machine is best suited to your needs.

One way to understand the differences among these nine machines is to look at the



Photographs: Craig Cutler

history of the portable computer. My earliest contact with one was my dad's little Hewlett-Packard programmable calculator. It had a tiny LED numeric display (one line of about 15 digits) and a slot through which he would slide a little strip of paper. The paper had a magnetic strip on the back on which you could store programs.

The next big milestone was the famous Osborne computer, introduced in 1981. It had a weird 25-line by 52-column CRT screen and was as portable as a sewing machine, but it came cheap and was an overnight sensation. All of a sudden, you could really take your work home at night.

Later in 1981, Epson introduced the HX-20 laptop, which had an LCD display and 16K bytes of memory. It had only a 4-line by 20-column display and was not that popular. Grid brought out its first laptop in 1982 (see "Boxing the Grid Compass," *PC Magazine*, Volume 2 Number 3) with an amazing electroluminescent display, but its equally amazing price—over $8,000—further postponed most laptop purchases.

The big event occurred in 1983. Radio Shack brought out the Model 100: 4 pounds of pure productivity. It had an 8-line by 40-column display that was big enough to use for writing. It could take up to 32K bytes of memory and had word processing, communications, and other software stored in ROM. It had serial and parallel ports plus an internal 300 direct-connect modem, so that you could use it anywhere to download or upload files. It was an instant hit with journalists and other writers, and many newspapers bought them by the dozen for their staffs.

Theory of Evolution

Since those humble beginnings, dozens of entries have debuted on the portable market. Some are CRT-based descendants of the Osborne; these simply take a desktop system and rivet a luggage handle to the back. True portables, such as the ones reviewed here, overcome the problems of size, weight, and functionality in remarkably creative and resourceful ways. They offer various types and sizes of display. Some rely on battery-powered memory for storage, while others use floppy disks. A few have built-in software. Several offer myriad ports to communicate with peripherals and the world, and others have everything built-in, including a printer.

Some of these factors will be important to you as you make your selection. If you plan to carry the machine from one office to another, then battery power may not be important to you. On the other hand, if you expect to work in transit, then independence from the power grid is essential.

The kind of work you do also makes a difference. If you will primarily be entering text, then you can often get by with a small display. Those who need to do a lot of spreadsheet work, however, will want to get as close to the standard 25-line by 80-column screen as possible. If you must run specific programs, be sure that the computer will run them. It must have sufficient memory and a convenient way to load the programs from some other source. The bundled programs can be extremely useful in many of these machines, but only if they do what you need. Remember that 50 pounds of cheap dog food is only a great bargain if you have a dog.

Which is the best machine in the bunch? For me, battery power and a legible screen are more important than MS-DOS capability, provided I can easily trade files back and forth with my "big" computer. My choice would be the Zenith ZP-150 or the Tandy 200 because they have those features, plus some useful programs (see "Editor's Choice"). Your needs will probably be different, so sit back and enjoy *PC Magazine*'s quick stroll through the mobile world of portable computing. Who says you can't take it with you?—**Alfred Poor**

TANDY 200

Seasoned travelers understand the virtues of traveling light. My rule of thumb has always been "the longer the trip, the less you carry," with an emphasis on versatile items that can stand up to the rigors of travel. The Tandy 200 lives up to this dictum. It packs a lot of computing power into its sturdy 4.2-pound, 11¾-inch by 8¼-inch by 2-inch box.

What you get is not, at first glance, very much. The standard configuration includes 24K bytes of nonvolatile RAM (expandable to 72K bytes), a built-in 300-baud modem, a 34-key, 12-function-key keyboard covered by a flip-top two-position text-only LCD screen, and a few software packages in ROM. A serial and a parallel port adorn the back of the machine, as does a system bus for adding on hardware peripherals. You can add more memory beneath slide panels on the bottom of the unit. This equipment obviously doesn't

EDITOR'S CHOICE

It is easy to see that the MS-DOS entries are much improved over the last laptop generation. Plasma screens and the back-lit LCD on the Pivot II show that a portable screen can be legible. As a class, however, they all suffer from high cost and arm-stretching weight as a result of their attempts to deliver full-screen displays and disk drives.

*If all you need is a smart notepad that will let you enter your travel work without rekeying, then the utility portables offer a better value. It takes little time or effort to plug a serial cable into the back of one and dump your deathless prose into your "mainframe" PC. (*PC Magazine *editor Bill Machrone even has a set of batch files and macros to make the process quick and easy.)*

As a result, the Editor's Choice for laptops is the **Tandy 200.** *It is priced low enough so that you wouldn't consider buying a COMPAQ instead, yet it does enough of what you need to do on the road so that the expense is justifiable. True, its ROM software is about as lightweight as its physical design, but you can use the megaprograms stored on your primary PC's hard disk to do the heavy work.*

Of course, Microsoft's Works *programs on the* **Heath ZP-150** *would be much nicer to have, but the machine's not-so-lightweight list price of nearly $2,000 makes it much less attractive. As it turns out, however, Heath is running an introductory promotion price of $1,195 through the end of the year, and at that price, we would choose the ZP-150 over the Tandy.* ■



TANDY 200

This little machine could withstand a month in the jungle or a pounding by Hulk Hogan and be none the worse for wear.

qualify the Tandy 200 as a primary PC for any but the most casual user. But as a tool to tide the business users over until they can return to the real computer at the office, this machine may have all the necessary features.

Overall, the unit has a good solid feel. I get the impression that this little machine could withstand a month in the jungle or a pounding by Hulk Hogan (or both) and be none the worse for wear. Its battery power lasts about 14 hours without replacement, which is more than adequate in most situations. The keyboard is quiet and gives a satisfying tactile response. The keys are well placed and slightly oversized. The 16-line by 40-column screen display is readable even in merely OK light, and it scrolls

PC FACT FILE

Tandy 200
Tandy Corp.
1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011
List Price: With 24K RAM, built-in 300-baud modem, text-only LCD screen, and simple software in ROM (word processor, calendar/scheduler, address/phone, *Multiplan*), $999.

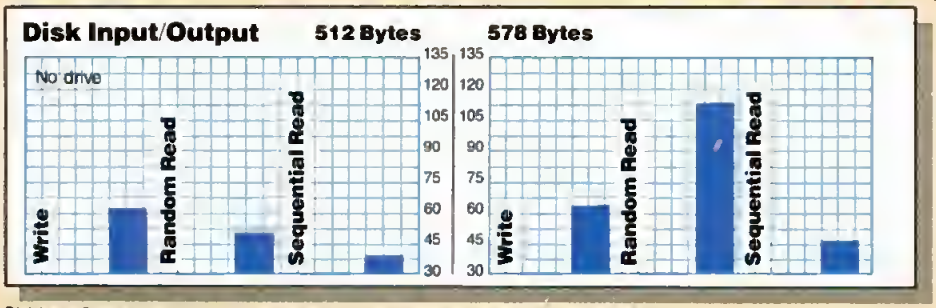
CIRCLE 678 ON READER SERVICE CARD

PC BENCHMARK

Tandy 200

Tandy
Drive type: None

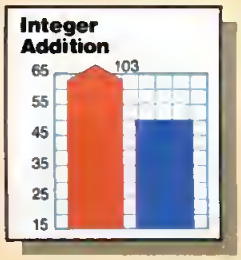
IBM PC
Drive type: 5¼" floppy

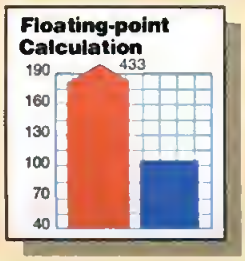


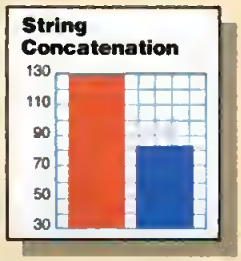


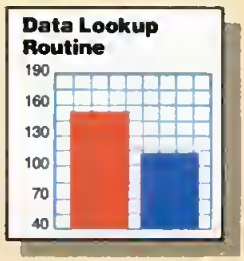
Disk Input Output Test: This benchmark measures the time it takes to create a 200K data file using record lengths of 512 bytes and 578 bytes. The test program then does a random read of 256 records from this file, followed by a sequential read of the same records. The results are compared with those of the IBM PC.

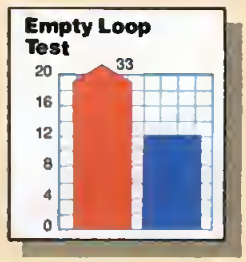
All results are in seconds











and updates quickly. It could, however, be improved by backlighting or, at least, by adding a viewing position at a wider angle to the keyboard. With the computer sitting in your lap, the display can be difficult to adequately adjust.

The Tandy's user interface is a simple menu that lists the six built-in ROM software packages and any files you have in memory. Files created with a given program are conveniently labeled with an identifying file extension, and when you select a file from the menu, the system automatically places you in the program that created it. The programs themselves—BASIC, TEXT (editor), TELCOM (communications), MSPLAN (*Multiplan* spreadsheet), ADDRSS, and SCHEDL—are rudimentary but serviceable and easy to use. While these programs would probably not suffice in any serious business context, they have the advantage of having a rather high degree of integration with one another. You create address and schedule files with your text editor, and among other possibilities, you can edit BASIC programs with TEXT and access phone numbers from ADDRSS to autodial with TELCOM.

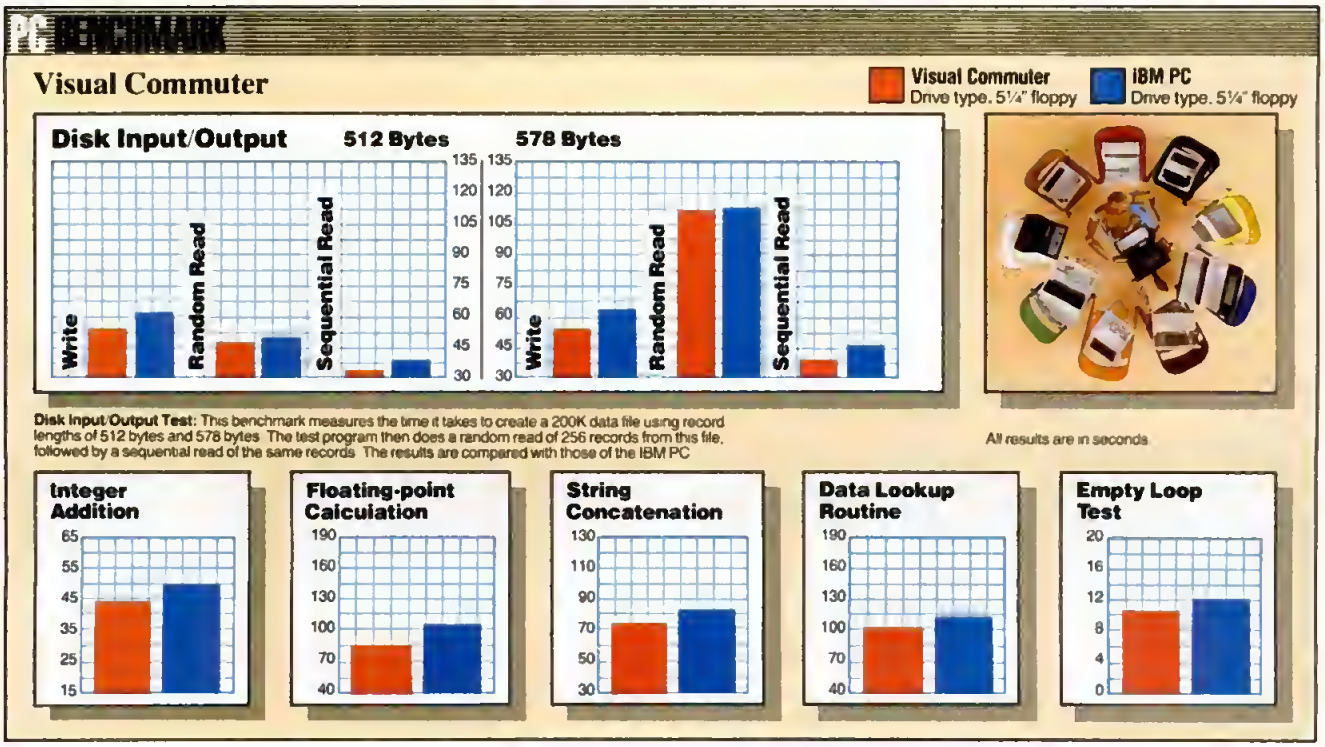
Portability is the best reason to buy a laptop, but expandability is a very good reason to keep one. In this respect, the considerable hardware and software support available for the popular Model 100 gives the Model 200 an instant advantage (see "The Model 100 Lives On with Add-ons," *PC Magazine*, Volume 4 Number 15). The Tandy 200 has no built-in disk drives or printer, no graphics display, and is not even PC compatible. Even in its minimum configuration, however, the Tandy 200 is the best traveling computer I've seen yet. And at a list price of a mere $999, surely no serious traveling businessperson can afford to leave home without one.—**Paul Stafford**

VISUAL COMMUTER

Some things improve with the passage of time and a second look. Others just confirm your first impressions. When *PC Magazine* first looked at the Visual Commuter (see "Good Is Not Good Enough," *PC Magazine*, Volume 4 Number 17), it appeared to be a collection of some good ideas hampered by a fair number of design flaws. Unfortunately, the situation hasn't changed.

For example, the screen is fairly readable. But it is housed in the machine's lid and pivots back to only one position—about 30 degrees beyond vertical. It would have been a simple matter to add a ratchet or some mechanism to allow users to adjust the viewing angle. The keyboard, which has a good solid feel and has LCDs on the NumLock and CapsLock keys, also sports the traditional IBM layout—that is, the Backslash key sits where the shift should be. And the large black plastic carry handle folds out directly in front of the keyboard. There's no place else for the handle to go, and it takes a good 2 inches of valuable desk space in front of the machine.

Although the Visual Commuter is a bit smaller than a monopoly board, you probably won't use it on your lap. And although it is fairly light (16 pounds for the basic one disk drive version), it is bulky to carry. You can't use it without AC power, and depending on your eyesight and how





VISUAL COMMUTER

The screen is readable, but it is housed on the machine's lid and pivots back to only one position—30 degrees beyond vertical.

you take to the fixed viewing angle, you might not be able to use it at all.

You may have to tax your imagination to come up with scenarios into which the Visual Commuter fits. Yes, it's portable. Yes, it's IBM compatible. Yes, you can carry it from place to place and run your favorite software. Yes, it seems to be well built (if not imaginatively so) and should perform dependably. But its annoying design quirks outweigh these attractive features. A computer—or any tool, even a garden rake—should function without calling attention to itself.

You should definitely give this machine a thorough test at home before you buy to see if you can live with it.—**Jon Pepper**

PC FACT FILE

Visual Commuter
Visual Technology Inc.
1703 Middlesex St.
Lowell, MA 01851
(617) 459-4903
List Price: With 256K RAM and two disk drives, $1,895.
Requires: AC outlet

CIRCLE 679 ON READER SERVICE CARD

ZP-150

Although it is not often the case, you should be able to just turn on a portable PC, anywhere at anytime, and go to work on it. This dictum implies that you do not have to bring a mass of essential items, such as power cords, external modems, and program disks, with you to make the computer work.

The ZP-150 may well be the best implementation of the ideal portable yet. It comes with two tiny ROM chips installed in the back, and these contain just about all you would ever want in the way of programs. These ROMs contain Microsoft's *Works*, a set of programs designed specifically for laptop use. *Works* includes five programs, BASIC, and three pop-up utilities. The two major tools are *Word* and *Plan* (versions of *Microsoft Word* and *Multiplan*). In addition, a *File* program helps create simple databases; a sophisticated *Calendar* program manages your time effectively, and *Telcom* lets you communicate through the internal 300-baud modem. The BASIC is a full-featured version of Microsoft BASIC, including graphics commands and a library of database management calls.

The pop-up programs are not just useful; they are fun. One is a calculator (one of my favorite *SideKick* features) that not only has a memory register but also displays your calculations as if they were appearing on a paper tape. The phone dialer utility lets you use the modem as an autodialer for voice calls, and the alarm utility lets you make use of the internal clock to warn you of important checkpoints throughout the day.

These programs are not stripped-down versions; the introductory manual with its overview tutorial is about 85 pages long, and the reference manual for the software is more than 900 pages, including some extensive tutorials. The manuals give clear instructions on how to upload and download files for use with the different programs and how to transfer files between them within the ZP-150.

If you simply want to transfer a few lines from one application to another, you can use the "scrap" feature. When you delete data from a screen, you often have the opportunity to send it to the scrap area. From there, you can retrieve it to be restored to the same application (similar to a block move in most word processors) or switch applications and paste the data into the new program. I created a spreadsheet in *Plan* and used the scrap feature to store a few lines. I then opened a *Word* file and pasted the lines into it without a problem.

The system manager, an intuitive operating system, organizes these programs. Each file is displayed alongside its corresponding program; all *Word* files are shown on the same line as the *Word* program. To work on a file, you highlight it with the cursor control keys and press the Enter key. The computer automatically loads the appropriate program and opens the file, and then you can go to work.

PC FACT FILE

ZP-150
Heath Co.
P.O. Box 167
Benton Harbor, MI 49022
(616) 982-3200
List Price: With 32K RAM and Microsoft's *Works*, $1,995.

CIRCLE 681 ON READER SERVICE CARD



HEATH ZP-150

Two tiny installed ROM chips contain just about all you would want in the way of programs.

The keyboard is fairly typical for the breed, except that it has no separate numeric keypad. The ZP-150 has a numeric pad "embedded" in the keyboard (as do the Tandy models 100 and 200). The cursor keys are in a compass arrangement at the upper right-hand corner, and the ten function keys are arranged along the top edge starting on the left side. The full-size keys generate a fair amount of noise and offer only slight tactile feedback, but it is an acceptable keyboard to use.

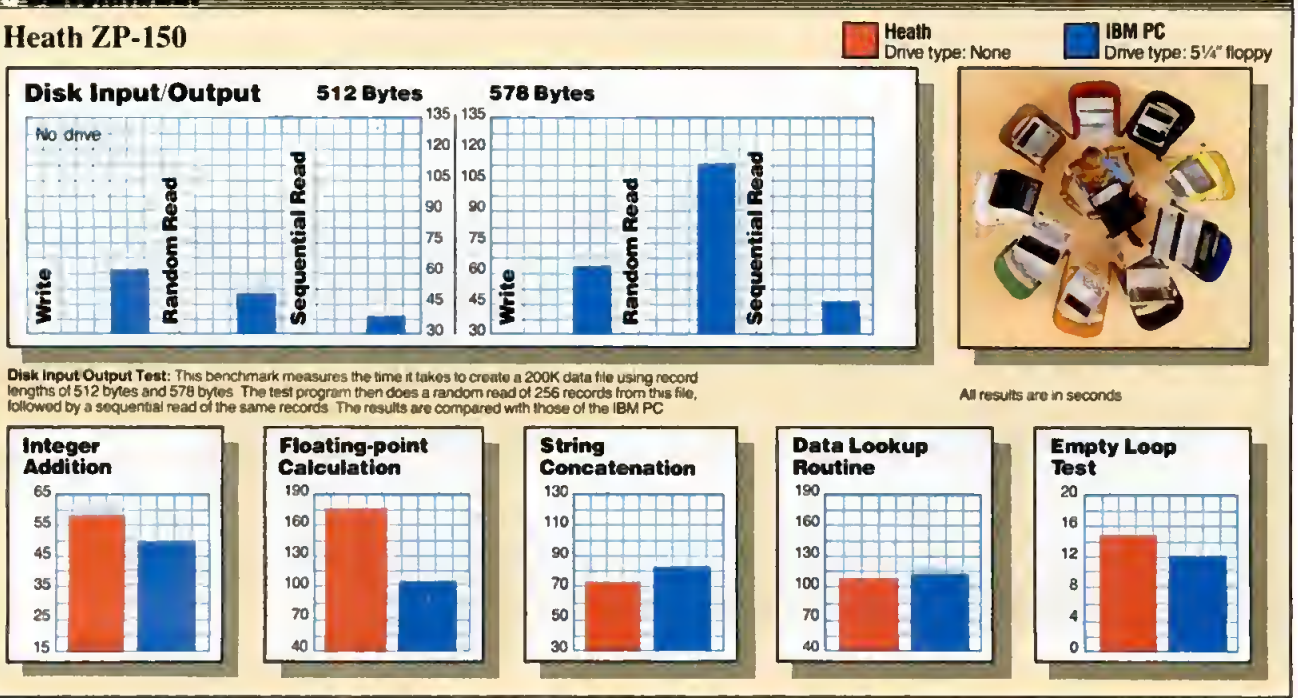
The screen is a 16-line by 80-column LCD, with a contrast adjustment. The character set is a modified Broadway font, and I must admit that I find it distracting and difficult to read. The display itself is one of the better LCD screens I have used, so the font is actually more of an annoyance than a major flaw.

Besides the internal modem, the ZP-150 sports a serial port, parallel port, handset connector, acoustic coupler connector, bar-code-reader port, and cassette connector, along with a port for a system bus. All of these allow your portable to talk to your desktop and almost any other peripheral.

The ZP-150 has the productivity software that many users need, packed with

PC BENCHMARK

Heath ZP-150



power yet squeezed into an 8-pound box that fits in a briefcase. The screen is big enough to make spreadsheet work worthwhile, yet it is clear and legible. Its only drawback is the somewhat steep price tag. But if you need a truly portable machine, the ZP-150 is one to try.—**Alfred Poor**

MORROW PIVOT II

The original Morrow Pivot was an undeniably appealing machine. The new and improved Pivot II is not totally new, but it is certainly improved in a number of very important areas. And the appeal of the original version has only increased with the new machine (see "Pivot Passes the Screen Test, "*PC Magazine*, Volume 4 Number 11).

The Pivot II still looks exactly the same as the original Pivot when closed: like a good-size black handbag. When you open the box and pivot down the keyboard, you see the only real visible difference between the two models: The Pivot II sports a full-size 25-line by 80-column screen in place of the older 16-line model.

MORROW PIVOT II

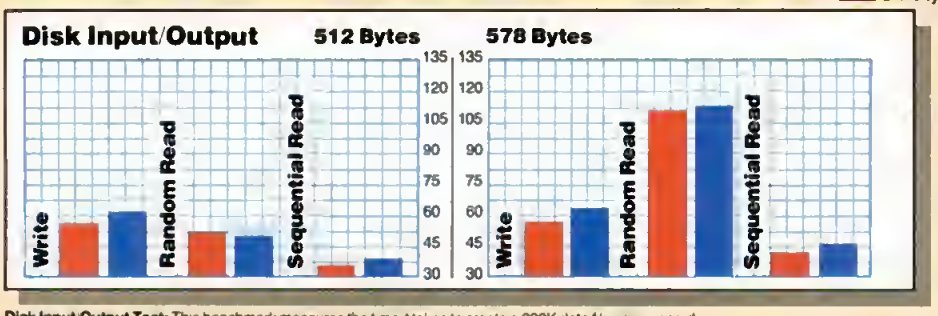


The Pivot II has some nice features built-in: a phone dialer, a world map/time zone display, an appointment calendar, and a calculator.

PC BENCHMARK

Morrow Pivot II

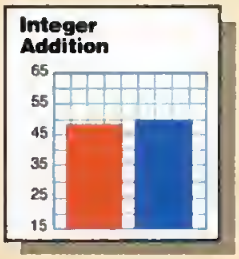
Morrow Pivot II — Drive type: 5¼" floppy
IBM PC — Drive type: 5¼" floppy

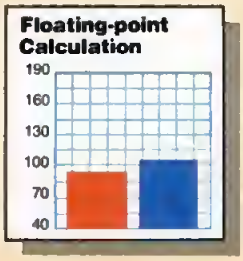


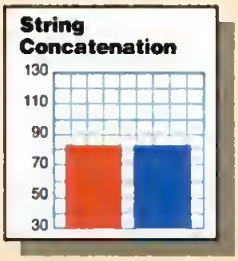


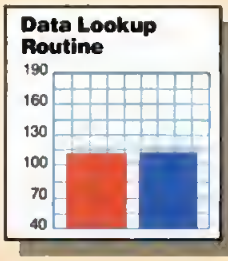
Disk Input/Output Test: This benchmark measures the time it takes to create a 200K data file using record lengths of 512 bytes and 578 bytes. The test program then does a random read of 256 records from this file, followed by a sequential read of the same records. The results are compared with those of the IBM PC.

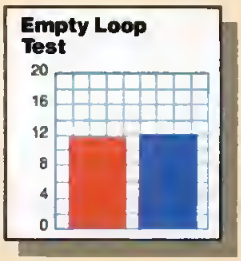
All results are in seconds











The Pivot II display is still an excellent backlit LCD, which is vastly superior to other LCD screens. While its legibility may lag a bit behind that of the new gas plasma displays (though not too much), you would be hard-pressed to find an LCD that is easier to read. (The pivot display and the gas plasma displays seem an even match initially, but the plasma displays will probably be a little kinder to your eyes over extended periods of time.)

The Pivot II offers at least one big difference that you can't see: true IBM compatibility. The original Pivot would only boot Morrow's version of MS-DOS and run selected software. The Pivot II will boot PC-DOS directly and could run all the PC software with which I tested it. Also new is the optional 1200-baud modem, which should alleviate most of the earlier models' limited communications capabilities.

With the Pivot II, Morrow has improved disk-access speed, though you still won't mistake it for a PC with a turbo board. The older version used to take so long to boot MS-DOS that you could forget why you were sitting in front of that little black box. The Pivot II's two 5¼-inch drives also seem to be much quieter.

The Pivot II also has some unusual and nice built-in features: a phone dialer, a world map/time zone display, a calculator, and an appointment calendar that will beep an alarm to remind you about scheduled events. You access these features by pressing icons on the membrane strip at the top of the keyboard; they nearly amount to a ROM-based version of *SideKick*. They're easy and fun to use and should probably be standard on all PCs.

To be sure, the Pivot II has some drawbacks. The keyboard feel could be better, and the Shift keys are on the small side. The keyboard can't be detached, which would have been nice. And the contrast control knob is located in a recessed well on the left side of the machine right next to the on/off switch. It is entirely possible to turn the machine off while you're merely trying to get a closer look at the bottom line of your spreadsheet. But these are drawbacks that you can live with, and most could be easily improved.

As a portable, the Pivot II gets high marks. You can use it under all sorts of lighting conditions, and with the battery pack in, you could work almost anywhere you have a bit of flat space. The machine is straightforward and easy to operate, and the documentation is uniformly excellent.

Somehow, the Pivot II's attractiveness transcends basic logic. There are faster machines, sleeker machines, less costly machines, and smaller machines. But although other machines might boast more-impressive specs or more bells and whistles, this Morrow laptop computer has got something. If you need IBM compatibility and portability, the Pivot II deserves a long, hard look. The chances are good that you'll be as attracted to this machine as I am.—**Jon Pepper**

PC FACT FILE

Morrow Pivot II
Morrow Inc.
600 McCormick St.
San Leandro, CA 94577
(415) 430-1970
List Price: With 256K RAM and two disk drives, $1,995.

CIRCLE 680 ON READER SERVICE CARD



PANASONIC EXECUTIVE PARTNER

It is not a tiny machine, but your reward for your trouble in carrying the Executive Partner is the bonanza within.

PANASONIC EXECUTIVE PARTNER

The Panasonic Executive Partner is one of the first of the "new generation" portable machines: As much emphasis has been placed on producing a legible display as on making a portable package. In the case of the Executive Partner, the legibility comes in the form of gas plasma technology.

Perhaps the designers at Panasonic spent a little too much time on the display, however, and not enough on portability. The Executive Partner comes in a plastic case that closely resembles a small submarine in shape and a large rock in weight. The 25-line by 80-column display is housed inside the top cover, which unlatches and flips up. When you boot the machine, you can immediately see the difference: The text is bright orange on an orange background. Although it may remind you of Halloween, the display is extremely

readable, especially if you have been laboring over a Tandy 100 or another first-generation LCD portable computer.

The display format supports 640- by 200-dot resolution, with an 8 by 8 matrix for graphics and 8 by 16 for text. It also supports IBM color graphics, but with a few alterations. Even though the screen supports inverse video and highlighting, it represents colors by a rather arcane series of font changes that the manual almost manages to describe clearly. Obviously translated directly from Japanese, the manual suggests: "For making clear definition to the color software on the plasma display, we propose following definition by character change." (It doesn't make sense to me either.) Panasonic uses a combination of roman, bold roman, italic, and bold italic typefaces to define the colors that are supported. If you can follow (or care) that magenta is displayed as bold italic and light gray is displayed as roman, more power to you. Needless to say, the display screen can end up looking a little bizarre.

Despite the unique color, I didn't experience any eyestrain using the plasma display, and it should be relatively kind to your eyes, even though it is still not as good as a high-resolution monochrome CRT. Three minor complaints about the display: It has no contrast control; the display would be improved if the background were black instead of orange; and the typeface, though well-etched, could be more readable. Screen performance is excellent: It has a quick refresh rate and no noticeable lag in scrolling.

The layout and feel of the keyboard are commendable. The keys have a nice, natural click sound and a positive tactile feedback. I found the keyboard to be very comfortable during prolonged touch-typing. The ten function keys run in a horizontal row across the top of the keyboard, and the Return key is oversized. My only objection to the keyboard is its small IBM-style Shift keys.

The Panasonic Executive Partner is not a tiny machine, but your reward for your trouble in carrying it is the bonanza within: 256K bytes of RAM, two 5¼-inch disk drives, a dual clock speed (the 8086 CPU can run at the slow IBM speed of 4.77 MHz or at a fast 7.16 MHz, and a built-in thermal transfer printer. It has one built-in expansion slot, and an expansion bus is available that is compatible with any IBM cards.

The built-in thermal transfer printer requires special paper to operate. Graphics and text are quite sharp, but the feel of the thermal paper is, as one *PC Magazine* staffer eloquently puts it, "yucky." The printer adds considerably to the overall size and heft of the machine. Everyone who entered the PC Magazine Labs and examined the Executive Partner asked the same question, "Is the printer optional?" Unfortunately, the answer is no.

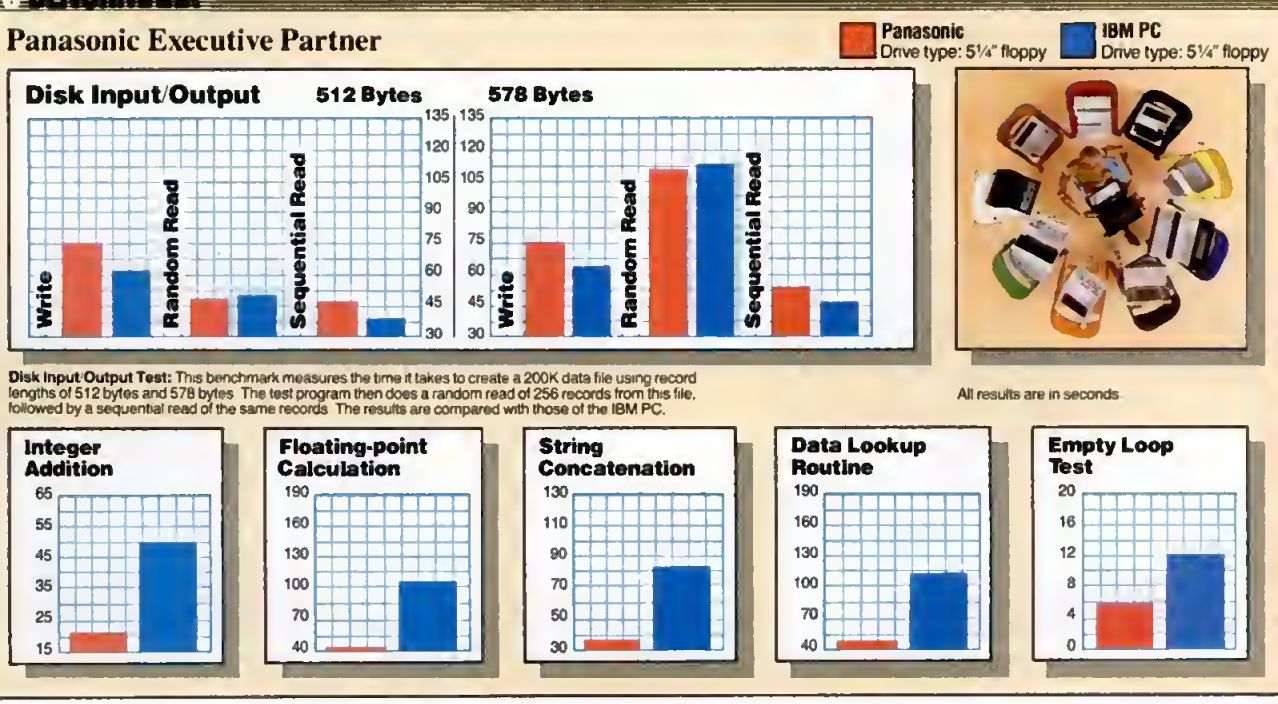
The Panasonic Executive Partner performed well and fairly quickly, especially in its high-speed mode. It ran all the software tested: *1-2-3*, *WordStar*, *SideKick*, and *XyWrite*. Compatibility is certainly not a problem.

PC FACT FILE

Panasonic Executive Partner
Panasonic Industrial Co.
One Panasonic Way
Secaucus, NJ 07094
(201) 348-7000
List Price: With 256K RAM, two disk drives, and built-in printer, $2,595.
Requires: AC outlet
CIRCLE 682 ON READER SERVICE CARD

PC BENCHMARK

Panasonic Executive Partner



Disk Input/Output Test: This benchmark measures the time it takes to create a 200K data file using record lengths of 512 bytes and 578 bytes. The test program then does a random read of 256 records from this file, followed by a sequential read of the same records. The results are compared with those of the IBM PC.

All results are in seconds.

TAKING IT ON THE ROAD

Portable personal computers are racking up hours of overtime when busy executives are away from the office.

Laptop computers add the invaluable elements of portability and functionality to the world of computing. From Nairobi to the Himalaya mountains to the soundstage at the Farm Aid benefit concert in Champaign, Illinois, laptop computers are faithfully recording data for a growing and eclectic club of users. But what can laptops offer the average executive in the gray flannel suit?

After tracking down some of the most mobile professionals in the world, *PC Magazine* found a group who can't get along without their portable laptop computers.

PC Magazine's own editor, Bill Machrone, jets off to Austin one day and Australia the next. He also makes a daily 1-hour commute from his home in New Jersey to his New York office.

Machrone uses a Tandy Model 100 laptop computer—what he calls "the businessman's cure for loneliness"—to handle his heavy writing load. Articles, memos, editorials, and personal notes originate in the electronic notebook. When he's on the road, he can use the 100 to keep in touch with the office via MCI Mail.

Sue Bohle, founder and president of The Bohle Agency, uses an Epson Geneva PC-8 to manage meetings, clients, and the administrative work of her Los Angeles–based public relations firm. The Geneva goes on long plane trips with Bohle to record with a word processor what a traditional executive usually dictates.

"I used to go through stacks of yellow legal pads," confesses Bohle, "the old symbol of most working executives." Bohle enjoys being able to send her assistant a memo via electronic mail.

More and more corporations are finding that laptops are useful for field representatives who need to keep in touch with the home office and process information while on the road.

More and more corporations are finding that laptops are useful for field representatives who need to keep in touch with the home office and process information while traveling on business.

The Life Insurance Company of Virginia in Richmond, Virginia, was among the first to use the universal life insurance policy. This method replaces the old insurance rate tables. As the new calculations became more complex, sales agents were unable to easily revise proposals in front of clients. "This resulted in a multivisit sales cycle where agents went back and forth between office and client," notes Ed Ernouf, manager of client support services.

Life of Virginia introduced its agents to the Data General/One, a PC-compatible laptop that allowed the company to put all the necessary software on a single disk. "We use the DG/One to assist agents in sales productivity and to decrease the sales cycle," says Ernouf. Agents can easily perform calculations on the DG/One in the client's home or office, eliminating multiple visits.

Tymnet, a division of McDonnell Douglas Information Services Group in Cupertino, California, has a field engineering force that travels to perform maintenance work on large computer systems. Ron Viviere, the manager of network technical support, explains why the company uses the Texas Instruments Prolite as a maintenance tool.

"The field engineers need terminal capabilities, calculation storage, and lo-



When traveling, Sue Bohle uses an Epson Geneva PC-8.



Editor Bill Machrone works on his Tandy while commuting.

Photographs (Left) Ken Rogers. (Right) Dennis Kitchen

cal processing on the road," he explains. "The Prolite is lightweight. They're already carrying around 50 to 60 pounds of equipment."

The Prolite has a specific I/O capability that the field engineers need. Tymnet has developed proprietary programs designed to work with the Tymnet network and communicate specific protocols in debug mode. The laptop's portability has helped Tymnet to meet its maintenance obligations.

Even in the business of managing creative endeavors, laptops are on the rise. Ken Levine, a film producer and president of Iris Film and Video in Seattle, Washington, is involved in numerous productions that require travel to Third World countries. He often has to manage paperwork that would be difficult for a multilingual secretary.

"At the end of filming, you end up with a box of receipts in currencies from three or four different countries," laments Levine.

His solution is the Hewlett-Packard 110. With *1-2-3* on a chip, Levine can design structured worksheets to handle multiple currencies and track total production expenditures. "It was a nightmare before that," he testifies.

Levine records script changes and footage notes with the HP 110. He can also transmit information back to his office in the States. And even though the HP 110 takes quite a lot of abuse from airplane trips and jeep travel modeled on the Indiana Jones school of transportation, Levine claims the laptop holds up very well.

Most laptop users I interviewed saw the laptop unit as more than an extension of the desktop PC. And as laptops continue to prove themselves as productivity enhancers and fully functional offices away from the office, don't be surprised to find one quietly recording a memo on your next plane flight.—**Virginia Dudek**



ERICSSON PORTABLE PC

The 25-line by 80-column display has small, deep-orange pixels that shine brightly.

Carry That Weight

The bottom line on the Executive Partner depends on how portable a machine you need. It certainly has much in its favor: a nice keyboard, compatibility, a high-speed CPU, and even a built-in printer. However, the Executive Partner requires AC power, so even though the display is readable under all sorts of conditions, the machine isn't usable under all sorts of conditions.

If portability is your top priority, you'll have to decide if you really want a 30-pound traveling companion (about the weight of a COMPAQ computer) that can't walk—and don't forget that you need to allow extra room for disks and thermal paper, too.

On the other hand, if you don't mind the lack of flexibility in AC-dependency, and if you're strong enough to carry it, the Panasonic certainly is an interesting machine. But when the novelty of the plasma display wears off, you might wonder if, for $2,595, you wouldn't have been better off with a stripped-down PC at a second location.—**Jon Pepper**

ERICSSON PORTABLE PC

From the land of the sauna and the midnight sun comes a portable computer with a screen that glows like a sheet of warm embers. The Ericsson Portable PC's main claim to fame is its plasma display—one of the more novel approaches to solving the readability problems of most portable displays.

The 25-line by 80-column display has small, deep-orange pixels that shine brightly when on but still glow slightly when off. The screen appears to be the same panel used by the Panasonic Executive Partner, but the character set is different. It is more similar to the IBM display font than the Panasonic's is, but letters with descenders or ascenders are offset slightly and have a strange appearance. Because pixels are either on or off, bright characters are displayed simply by making the characters bolder, using more pixels to create a thicker font. The screen does have a brightness control (which is hard to find

and harder to reach), but I could not see any reason to set it at less than its maximum. Overall, however, this is one of the most readable displays of all the portables I have seen.

The Ericsson has other interesting features. For example, it is MS-DOS compatible and comes with DOS 2.1, which you load on its 5¼-inch, 360K-byte disk drive. It can read and write standard IBM disks and runs *SideKick* and *1-2-3* without a hitch. It has both parallel and serial ports plus ports for an expansion bus and a second disk drive.

It even has a built-in thermal printer that has a thermal transfer ribbon so that it can print on plain paper. The printer should not be the primary reason for selecting this machine. The print quality is only fair, it is difficult to load the paper, and it is a slow printer by almost any standard. Still, if you require a printer wherever you go, this one can fill in in a pinch with a complete package that still weighs in at less than 17 pounds.

The keyboard is laid out almost the same way as the standard PC keyboard, except that the function keys are arranged along the top edge, and an Enter key is below the plus sign (+) key next to the numeric keypad. The keys clack a bit with only a little tactile feedback. It is comfortable enough to type on, and most typists should have little trouble adjusting to its feel.

Ericsson has taken a creative approach to the problem of making its portable easy to use: the keyboard is detachable. It has a cable long enough to reach your lap comfortably, and two little legs flip down to allow it to stand at a slight angle on your desk surface.

The Ericsson machine that I received for evaluation had the optional ErgoDisk installed. This is a RAMdisk that you can load with data or programs and then reassign to be either drive A: or B: This feature can really take the curse off the fact that the computer has only one disk drive. I loaded *XyWrite* onto the ErgoDisk and then called up the program. It took only 2.5 blazing seconds to load the program and its configuration files. With a little experience and effort, you can probably make creative use of this feature and greatly boost your productivity.

With its disk drive, plasma screen, and built-in printer, the computer is not stingy in its power consumption and must rely on an AC outlet for its go juice. Ericsson has done a remarkable job of packaging the components, however, and the machine takes up less space than many briefcases. You can't add any expansion boards; there is no room for slots. The company has an expansion unit, however, that accepts standard IBM boards.

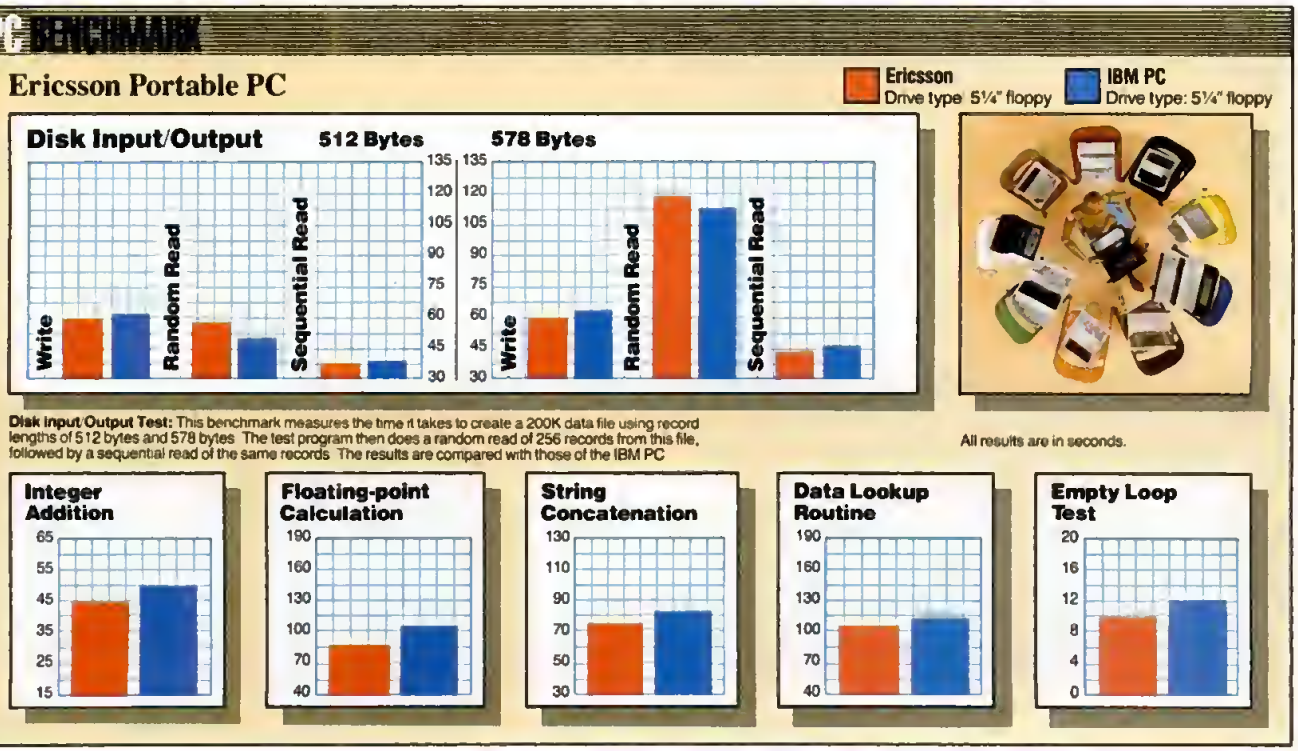
Lighter than a transportable, and with more memory and capabilities than most laptops, the Ericsson Portable PC offers a glimpse into what the future may hold for the next generation of portable computers. If you need to run MS-DOS programs and can get by on a single floppy drive, then this machine may fill the bill and give you one of the most readable screens in the bargain.—**Alfred Poor**

PC FACT FILE

Ericsson Portable PC
Ericsson Information Systems
7465 Lampson
Garden Grove, CA 92641
(714) 895-3962
List Price: With 256K RAM and one disk drive, $2,995.
Requires: AC outlet
CIRCLE 676 ON READER SERVICE CARD

PC BENCHMARK

Ericsson Portable PC



HEWLETT-PACKARD PORTABLE PLUS

Hewlett-Packard's new Portable PLUS goes beyond the company's older HP 110 by making a 25-line by 80-column display and plug-in ROM capacity standard equipment. Once you add the internal modem, the external 3½-inch disk drive and the ThinkJet personal printer, you've got a full-fledged computer system (see "The Hewlett-Packard 110: The Next Step in Portables," *PC Magazine*, Volume 4 Number 2).

Measuring 13 by 10 by 3 inches, the PLUS is truly a laptop, though its nearly 10 pounds may begin to weigh you down after you've carried it around awhile. The screen can tilt over a wide range of angles, which is important since the LCD screen is difficult to read if the lighting is bad.

In addition to an AC adapter-recharger, a modem phone jack, and a serial port, the PLUS has a port for the Hewlett-Packard Interface Loop, the standard HP interface.

When you switch on the HP PLUS, in-



HEWLETT-PACKARD PORTABLE PLUS

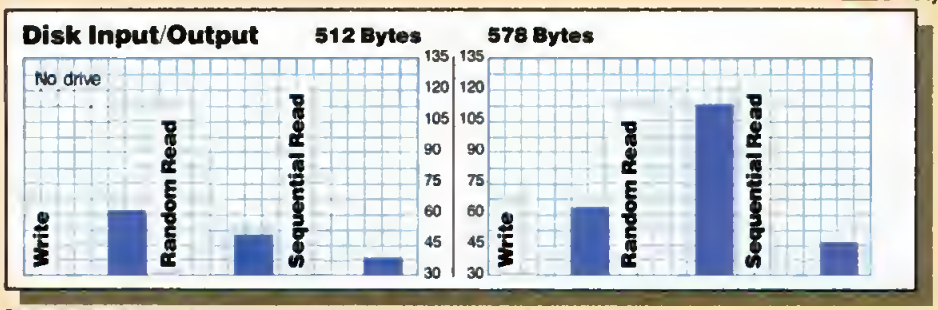
The Hewlett-Packard Portable PLUS is so complete that you could use it as your only computer.

PC BENCHMARK

Hewlett-Packard Portable PLUS

Hewlett-Packard Drive type: None

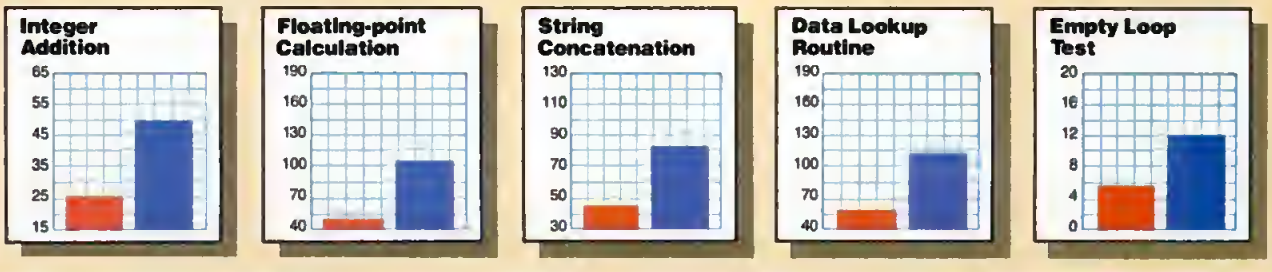
IBM PC Drive type: 5¼" floppy





Disk Input/Output Test: This benchmark measures the time it takes to create a 200K data file using record lengths of 512 bytes and 578 bytes. The test program then does a random read of 256 records from this file, followed by a sequential read of the same records. The results are compared with those of the IBM PC.

All results are in seconds



stead of seeing an A> prompt, you'll find yourself face-to-face with PAM, HP's Personal Applications Manager. PAM is a function-key, menu-driven interface that guides you through the use of the system. PAM carries out the basic DOS functions to handle files and directories and to print. It will help you configure system parameters such as cursor type and communications parameters. If you prefer, you can bypass PAM and go directly to MS-DOS 2.11 with a single keystroke. HP has also added the PAM-style interface to its ROM-based applications, including *Microsoft Word* and *1-2-3*, so that this standard interface runs in parallel with the program's usual interface.

One of the neatest features of the HP Portable PLUS is the flexibility of its memory. It has two drawers on its underside: a ROM drawer where you plug in the applications modules and a memory drawer where you can have 128K-byte RAM cards installed. You divide this RAM between main memory and user memory or electronic disk using PAM's system configuration menu. If you have not allocated enough memory for a particular application, you'll find yourself back at the main PAM menu; it would be helpful to see a message indicating that you have a space problem. The PLUS always treats the user memory as drive A: and the ROM modules as drive B:. When you want to save data, you must store it in a file on drive A:, just as you would with a real floppy drive. The batteries keep user memory intact when the machine is off.

You can protect your data with HP's security feature. Once you invoke the SECURE command, you must type in the password to even use the computer. If you forget the password, you can turn on the computer with a reset button, but you will wipe out everything in memory.

HP offers an optional 3½-inch disk drive, and more than 100 software packages are available in this form as compared with the handful presently available on ROM chips. One inconvenience of the disk drive is that it runs only with batteries and not an AC adapter. You'll still need the AC adapter for recharging the disk drive, which takes 8 hours. This recharge will give it enough juice for 8 hours of computer use, where the disk drive is being accessed 10 percent of the time. HP plans to upgrade the disk drive.

There's a more elegant solution for IBM PC users: You connect the PLUS directly to the PC using an HP-IL and the HP Portable Desk Top Link, a card that goes into your PC to make it behave as an external device of the PLUS or vice versa. With this arrangement, you can store your HP data directly on your hard disk and use your PC's printer. A third alternative is to upload data to your PC via the PLUS's internal Hayes-compatible modem, which operates at 300 or 1200 baud.

The PLUS's keyboard follows the design of the HP Touchscreen, which is a different format from that of the IBM PC keyboard. Since it has no Alt key, you reset the computer with Ctrl-Shift-Break. A special "extended-character" key brings additional key sets into play, including the numeric keypad and the extended-character or non-English character set. Since the additional sets overlay the rightmost alphabetic keys, these keys have three different functions depending on what other keys are pressed. The Portable PLUS is compatible with Microsoft, not IBM software. Applications programs and languages designed specifically for the IBM PC tend to hang up the PLUS or generate ominous messages such as "You cannot run BASIC as Child of BASIC." But the PLUS has no trouble running Microsoft's BASIC or Assembler. The only *PC Magazine* benchmark test PLUS could not run was the Disk Input/Output test.

The Hewlett-Packard Portable PLUS is a well-designed computer system in miniature. In fact, it is so complete that you could use it as your only computer. If your main PC is an HP 150, you will be able to share data and some programs freely between the machines. If, however, your desktop computer is an IBM PC or compatible, your two machines will be able to share data, but you may have to obtain different versions of your applications software for each one. An IBM PC user has the choice of using the HP PLUS merely as a note-taking tool, buying only Microsoft-compatible products, or investing in duplications of applications software in order to use the PLUS to its fullest capacity.

—Stephanie Stallings

PC FACT FILE

Hewlett-Packard Portable PLUS
Hewlett-Packard Co.
Inquiries Manager
1020 NE Circle Blvd.
Corvallis, OR 97330
(800)-FOR-HPPC
List Price: With 128K RAM, 192K ROM, operating system, personal applications manager, and diagnostics, $2,295.
CIRCLE 677 ON READER SERVICE CARD

DATAVUE 25

Although the Datavue 25 is a perfectly acceptable portable, there's something about it I don't like that I can't quite put my finger on. Its size is fine, and the machine is very easy to carry. Its screen is reasonable if not outstanding, and it has some nice extras like a RAM-disk, an easy-to-use setup feature, and a detachable infrared keyboard. While all this makes good sense on paper, it's hard to get excited about this machine.

Maybe it's the keyboard. The feel is both mushy and flimsy, and the Shift key is in the wrong place. Or maybe it's the LCD screen—lighting is important for legibility.

I have no complaints about the Datavue 25's performance. It is as compatible as the next portable (or desktop), and it's no slowpoke in either disk access or screen refresh. It supports the typical list of options, including a second disk drive and an expansion bus, but these significantly affect its portability.

When I first reviewed the machine (see "Good Is Not Good Enough," *PC Magazine*, Volume 4 Number 17), I had some doubts about whether the Datavue 25 offered the best price/performance ratio. Although those doubts persist, I liked the machine a little better this time around. The

PC FACT FILE

Datavue 25
Quadram Corp.
One Quad Way
Norcross, GA 30093-2918
(404) 923-6666
List Price: With 128K RAM and one disk drive, $2,195; 640K RAM, $2,795.
CIRCLE 684 ON READER SERVICE CARD



QUADRAM DATAVUE 25

If you need a very easy-to-tote PC-compatible portable with a disk drive, look at the Datavue.

RAMdisk is a nice way of avoiding the expense and weight of a second drive, and the machine is certainly lightweight. A battery pack contributes to its portability.

The Datavue's screen technology is not state of the art, and its overall performance doesn't distinguish it in the marketplace. But if you need a very easy-to-tote PC-compatible portable with a disk drive, look at the Datavue. If its keyboard, screen, and price appeal to you, it will probably serve you well.—**Jon Pepper**

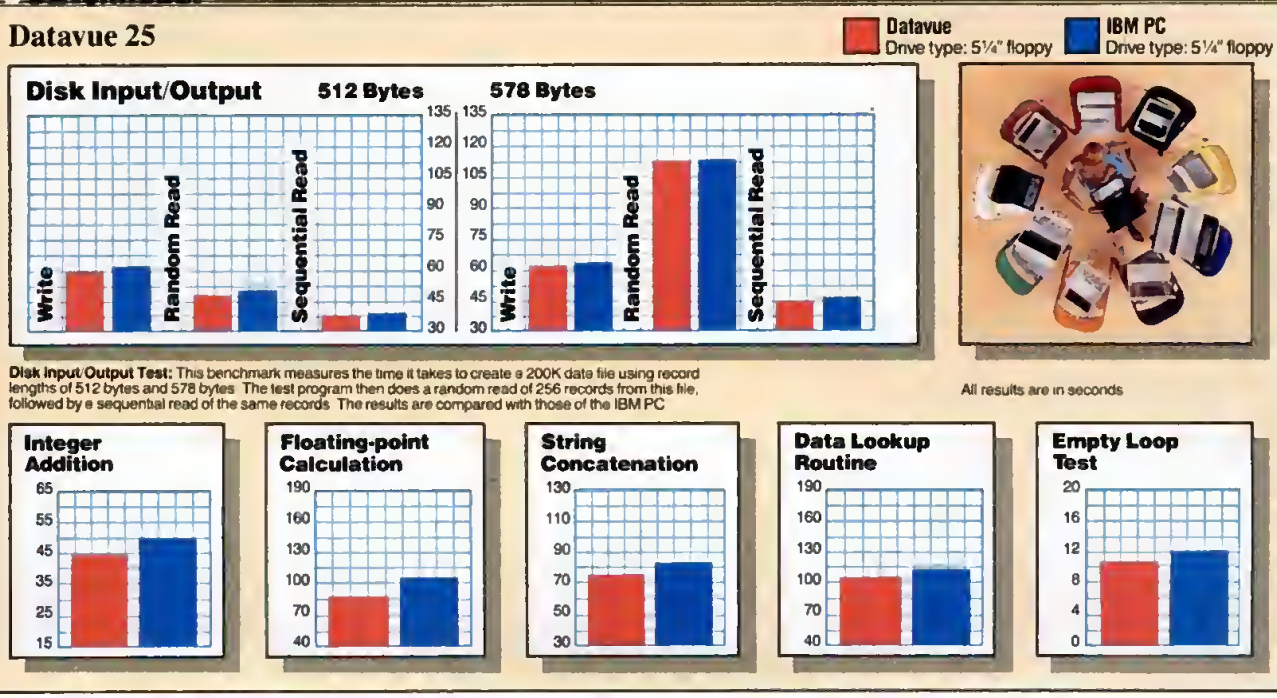
DATA GENERAL/ONE

What's expensive, attractively designed and built, comes with its own designer carrying case, is smaller than a breadbox, and has a screen that's almost impossible to read? The answer is the Data General/One.

The DG/One could have been a really great product. When *PC Magazine* first looked at this portable machine (see "Resorting to the Portable, *PC Magazine*, Vol-

PC BENCHMARK

Datavue 25



ume 4 Number 7), it seemed to have a lot going for it: a slimline profile, a huge display screen (for a portable), nice graphics capabilities, a high-capacity disk drive and much more. It had, however, two substantial drawbacks: its poor screen and high price (it's especially high with all of the options that you'll probably want). Not much has changed.

I have to give the keyboard poor marks, despite its good response, because the keys are too small and much too close together for my taste. If you have average or large hands, you might have trouble trying to effectively or comfortably touch-type on the Data General. The layout is also nonstandard, with the function keys on the top row

PC DATA FILE

Data General/One
Data General Corp.
4400 Computer Dr.
Westboro, MA 01580
(617) 366-8911
List Price: With 256K RAM and one disk drive, $2,995; 256K RAM and two disk drives, $3,495; 256K RAM, one disk drive, and modem, $3,295; 256K RAM, two disk drives, and modem, $3,795; 512K RAM, two disk drives, and modem, $4,995.

CIRCLE 683 ON READER SERVICE CARD

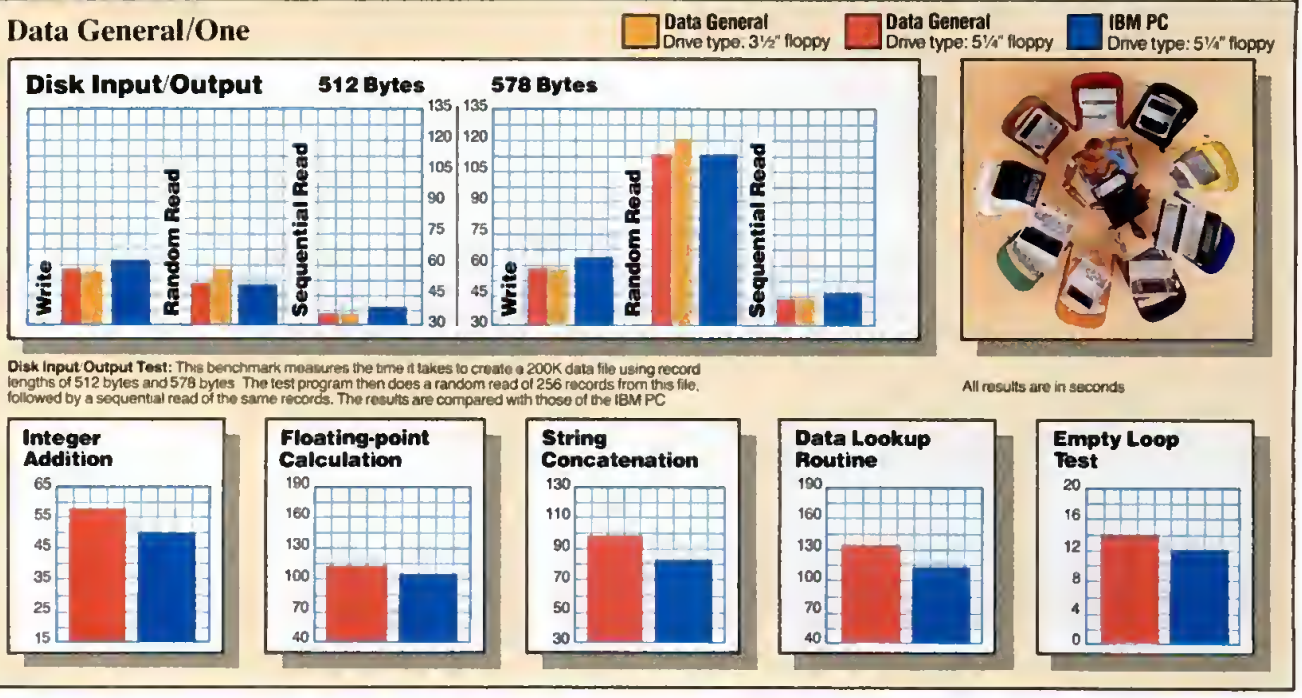


DATA GENERAL/ONE

The DG/One has a slimline profile, a huge display screen, nice graphics capabilities, and a high-capacity disk drive.

PC BENCHMARK

Data General/One



Disk Input/Output Test: This benchmark measures the time it takes to create a 200K data file using record lengths of 512 bytes and 578 bytes. The test program then does a random read of 256 records from this file, followed by a sequential read of the same records. The results are compared with those of the IBM PC

All results are in seconds

along with the Ins, Del, NumLock, Scroll-Lock, and PrSc keys—not the assortment of keys you expect to find in that location.

Although the DG/One will run all IBM software, you have to either purchase the programs on the 3½-inch micro floppy disks or buy the optional 5¼-inch external drive and download; both of these methods are needlessly expensive.

These are, however, fairly minor items and can be easily forgiven in a machine that is powerful, portable, and potentially very useful, were it not for the screen. Even with the somewhat "improved" display, the DG/One screen is simply very hard to read. The right lighting is extremely critical, and it is almost impossible to imagine working at the DG/One for any great length of time without suffering from discomfort and eyestrain. There is simply no excuse for that in a machine that comes with a premium price tag.

The DG/One offers a lot of options: a second micro floppy drive, increased RAM (up to 640K bytes), a portable printer (and battery pack), internal and external modems, a battery pack, a 5¼-inch external drive, IBM-compatible expansion chassis, and more. By the time you add all these features (if you could afford them all), you're still left with a powerful, fully outfitted machine that sports a very poor screen.

If the Data General Corporation were to come out with a truly readable display for the DG/One, it would be an extremely attractive package, especially if it were offered at a lower price.

—Jon Pepper ■

Alfred Poor is a consultant with soft-Industries, an independent microcomputer consulting firm in Southington, Connecticut. He is also a frequent contributor to PC Magazine *on a broad range of topics, including computers, peripherals, and programs. Jon Pepper, a frequent contributor to* PC Magazine, *is a technical writer and runs a letterpress printshop in Vermont. Stephanie Stallings is an associate editor at* PC Magazine *with a special interest in laptop computers. Paul Stafford, an editorial assistant at* PC Magazine, *is a portable computer fan.*

Laptops: A Survey of Their Main Features

Model	RAM capacity	Disk drive	Display	Standard I/O	Dimensions	Power supply	Bundled with computer	Options
Data General/One	512K	one 3½"	LCD 25 × 80	2 serial	13.7" × 11.7" × 2.8" 8.8 lbs	AC adaptar, rechargeable battery pack*	MS-DOS, notebook	Second 3½" drive, expansion chassis (5¼" drive or color graphics), adapter for parallel printer, internal modem, printer
Quadram Datavue 25	640K	one 5¼"	LCD 25 × 80	1 parallel 1 serial	13.25" × 10.5" × 8.13" 12 lbs	AC outlet, rechargeable battery pack*	MS-DOS, diagnostics	Second 5¼" drive, expansion chassis w/ 10-MB hard disk, adapters, keyboard cable, GWBASIC
Ericsson Portable PC	512K	one 5¼"	Plasma 25 × 80	1 parallel 1 serial	18.7 lbs	AC outlet	None	RAMdisk, 256K upgrade, external drive, printer
Hewlett-Packard Portable PLUS	896K	*3½"	LCD 25 × 80	HP interface 1 serial	13" × 10" × 3" under 10 lbs	Batteries	ROM contains MS-DOS, terminal emulator, PAM, utilities, diagnostics	External 3½" diskette drive, internal 1200/300 modem, ROM software modules, ThinkJet printer
Morrow Pivot II	640K	two 5¼"	LCD 25 × 80	1 parallel 1 serial	13" × 5.6" × 9.5" 14 lbs	AC outlet, batterias	MS-DOS, NewWord, communications	1200-baud modem, video outboard
Panasonic Executive Partner	640K	two 5¼"	Plasma 25 × 80	1 parallel 1 serial	16" × 16" × 21¼" 28 lbs	AC outlat	MS-DOS 2.11, BASICA	8087 coprocessor, 82-pin expansion slot, letter-quality printer
Tandy 200	24K	N/A	LCD 18 × 40	1 parallel 1 serial	11¾" × 8¼" × 2" under 5 lbs	Batteries	ROM contains word processing, filing, spreadsheet, communications, address, schedule BASIC	Modem cable, printer cable, RAM, ROM software, numerous third-party options
Visual Computer	512K	two 5¼"	*None included	1 parallel 1 serial	16" × 15" × 3" 18 lbs	AC outlet	MS-DOS, GWBASIC	16 × 80 LCD
Heath ZP-150	416K	N/A	LCD 18 × 80	1 parallel 1 serial	11.1" × 13" × 1.8" 7.7 lbs	AC adaptar, batterias	ROM contains Microsoft Word, BASIC, spreadsheet, Multiplan, database, calculator, communications	Unit is self-contained; no options necessary

*Available as an option.

PRINTOUTS TH

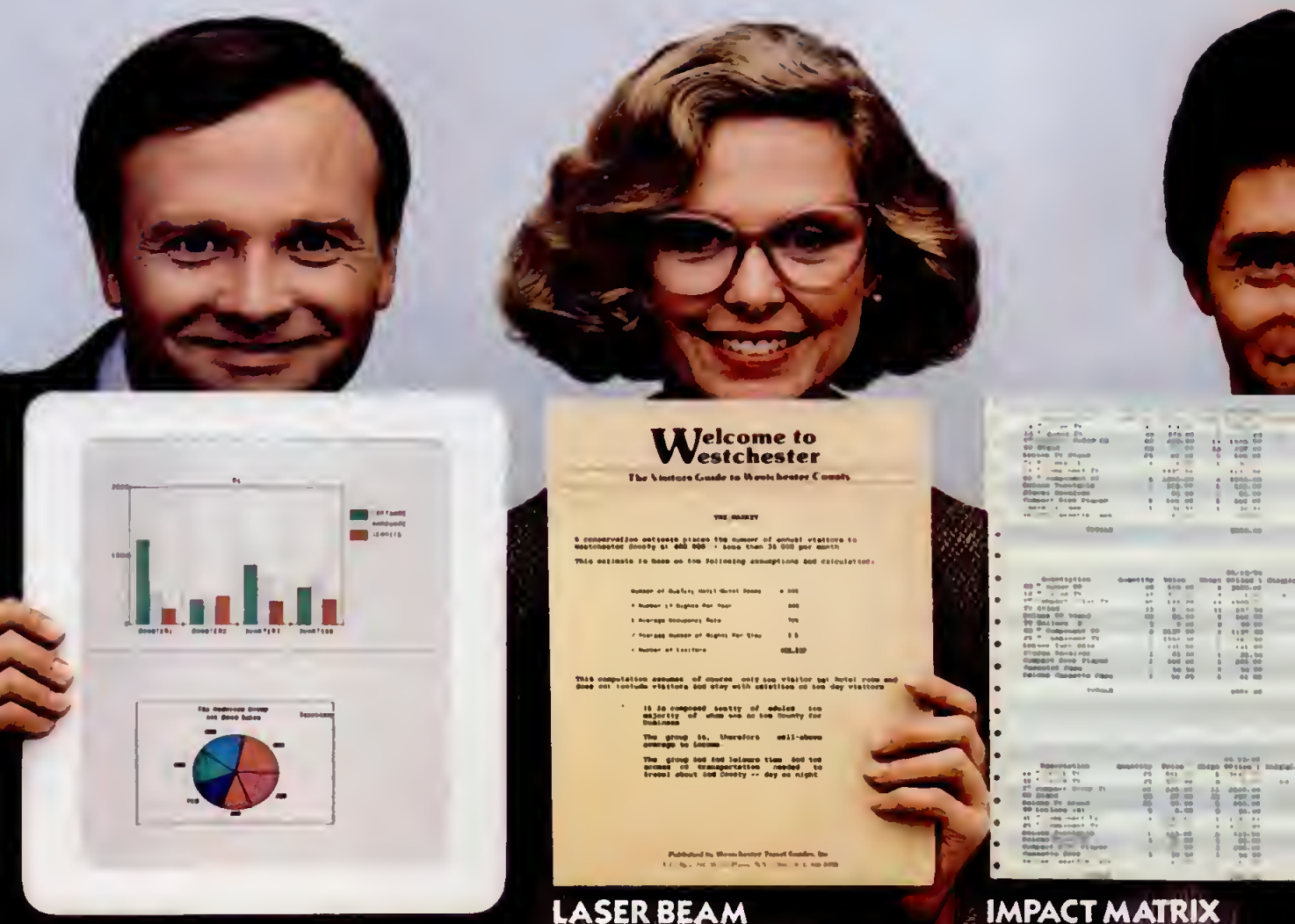
Take a close look at Canon's line of printers. The first thing you'll notice is how good they make you look.

That's because Canon's experience in high-tech optics really shows. For instance, Canon was among the first to make a desktop Laser Beam Printer. At a price that's within any business's reach, the Canon Laser Printer can produce eight pages a minute with a quality that's more in common with a professional print shop than a personal computer.

Canon also developed the ingenious Bubble-Jet Printer technology, finally making it possible for a printer to not only work extremely quickly but also incredibly quietly.

Our Ink-Jet Printer can produce exceptionally sharp, high-resolution graphics in seven colors, even on transparencies. While the Thermal Transfer Printer has three kinds of print modes, including letter quality, at a very competitive price.

And the Canon Impact Matrix Series, for regular and extra-wide column paper, makes printing very fast, very economical.



INK-JET

LASER BEAM

IMPACT MATRIX

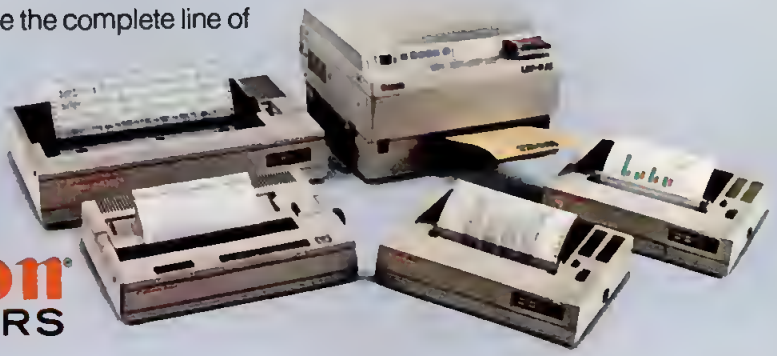
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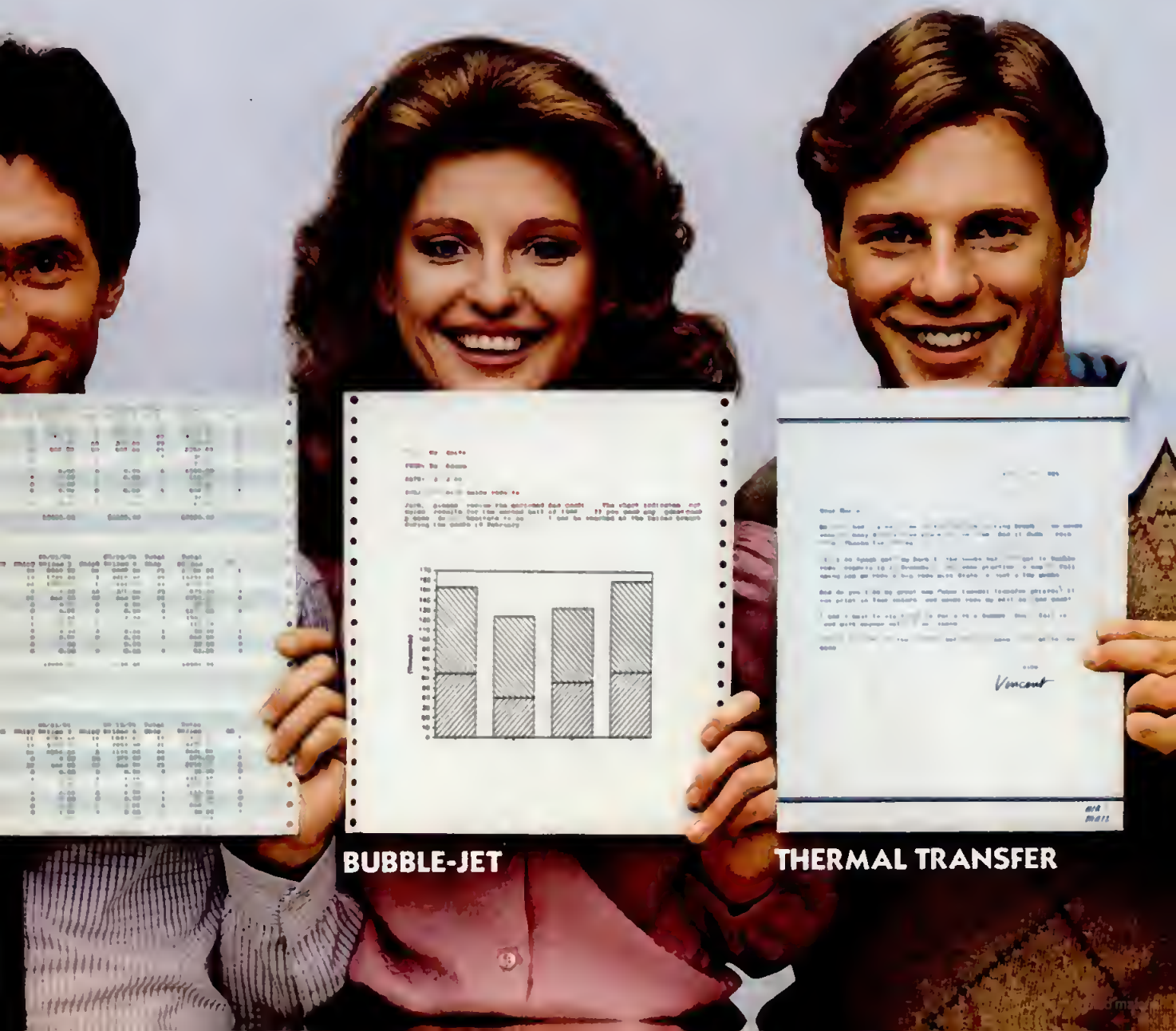
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For more information, call 1-800-323-1717, ext. 300 (in Illinois, 1-800-942-8881, ext. 300). Or write Canon U.S.A., Inc., Printer Division, P.O. Box CN 11250, Trenton, NJ 08650.



Canon PRINTERS

CIRCLE 213 ON READER SERVICE CARD





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CIRCLE 245 DN READER SERVICE CARD

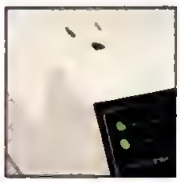
A PC Wish Book

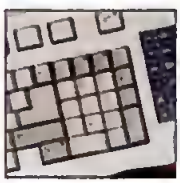


Photograph: Jay Brenner



There are only 32 days left till Christmas, and you're desperate for a gift idea for a friend, colleague, spouse—even yourself. Here's the next best thing to on-line shopping.





OK, here's how the PC Wish Book works. First, take a look at all the pretty pictures. If anything catches your eye, read the accompanying copy. If the words capture your imagination, take a big fat red magic marker and circle the picture and the copy. Then place the magazine, open to the page with the circle, in a conspicuous place around the house or office. Best case scenario: Somebody who wants to give you something you've been wishing for will see it and. . . . And if not? Well, it's the season for wishes.

—Christina Dyar



Not a Creature Was Stirring

Logimouse and PC Mouse

▲ Explore new peripherals. The R7-3F Logitech Logimouse is a multiple protocol mouse that will emulate any other mouse on the market. The technology is mechanical tracking with optical decoding, so the mouse movements are not confined to a grid pad. Logimouse comes with some smart software, including a Microsoft compatible driver, a configuration program, a text and graphics editor, and an external power supply for $189. (Logitech Inc., 165 University, Palo Alto, CA 94301, (415) 326-3885.)

If it's fine control you're hankering for, you might consider an optical mouse. Mouse Systems' PC Mouse is a three-button optical mouse whose movements are confined to a two-color grid pad. The package includes the mouse, mouse pad, 25-pin RS-232 connector, 9-volt power supply, and designer pop-up menu software. The software accommodates 13 of the most common mouse-driven software packages, including *1-2-3*, *Framework*, and *Symphony*. Also included are a Microsoft driver and software programs to configure your mouse with other applications packages. PC Mouse sells for $195, and a special Christmas promotional will make the PC Mouse available with PC Paint Plus, a paint package with full-page layout and text integration, for $240. (Mouse Systems Corp., 2336H Walsh Ave., Santa Clara, CA 95051, (408) 988-0211.)

Anyone Can Learn to Type

Typing Made Easy

Typing Made Easy teaches touch-typing interactively with a series of cleverly designed exercises, drills, and games. Detailed progress reports display your problem keys, speed, and accuracy. The program maintains records of all your typing test scores. A special administrative system makes this an excellent program for the classroom. The program costs $59.95, with a 15-day trial. (QED Information Sciences Inc., QED Plaza, 170 Linden St., Wellesley, MA 02181, (800) 343-4848.)

On Target

Touchdown

▼ For most of us, the pinkie of the right hand is not a precision instrument—a fact that is confirmed every time you reach for the Enter key and miss. Increase your chances of being on target and correct one of the more notorious deficiencies of IBM's standard-issue keyboard by attaching full-size keytops to enlarge the major control keys. (Hoolen Co., Dept. BB, P.O. Box 201, Cornville, AZ 86325, (602) 634-7517.)





Say It Big

Headliner

◀ Life offers dozens of occasions worthy of proclamation, and *Headliner*, from Zephyr Services, is an inexpensive way for you and your PC to rise to any occasion. Use *Headliner* to make your parties, social activities, shop displays, and large-scale announcements a hit. The program creates banners and signs in a variety of type sizes up to 13 inches high. Your message can be printed on any printer and is printed sideways so there's no paper adjustment necessary. *Headliner*, $19.95, runs on the entire IBM family and most compatibles and requires only 64K bytes of RAM. (Zephyr Services, 306 S. Homewood Ave., Pittsburgh, PA 15208, (412) 247-5915.)



A Small Investment

Cray X-MP/4

◀ For that special someone who already has everything: the Cray X-MP/4 supercomputer from Cray Research Inc. of Minneapolis, Minnesota. This top of the line, freon-cooled memory monster, shown here upholstered in Kushka Plaid Glazed Chintz from Brunschwig & Fils Inc., holds 16,000,000 64-bit words of direct addressable memory. The X-MP/4's 128 megabytes of raw computing power in four CPUs make structural analysis of the impact of a nose cone against an angled solid surface a snap. Interested in geological exploration? Color variable density displays of seismic wave propagation from a fluid through a faulted structure ought to pique your curiosity. The budding young scientist in your family could even graphically simulate atomic and molecular events, gaining insight into chemical reaction rates, catalytic mechanisms, properties of synthetic polymers, and the shapes of biological molecules millions of atoms long. Cray X-MP/4 can be purchased for a mere $16,000,000. The supercomputer's price includes vinyl-fabric upholstery, in a choice of 100 colors and neutral tones for its 12 vertical panels and power unit cushion covers. Kushka Plaid Glazed Chintz extra.

Spell It Right!

Webster's New World Spelling Checker and WHOOPS! Real-Time Speller

▶ This year you can make a resolution never to misspell again. The problem is easily resolved by using *Webster's New World Spelling Checker* from Simon and Schuster. The program checks 110,000 words, every word in *Webster's New World Dictionary* (Second Concise Edition), and most of the words from *Webster's New World Dictionary of Computer Terms*. Techniques for suggesting alternative spellings originate from *Webster's New World Misspeller's Dictionary*. The program will flag misspellings, run-together words, repeated words, incorrect abbreviations, hyphenations, apostrophes, and contractions. Adjustable search levels will do anything from listing errors to using search techniques that generate alternative spellings. An auxiliary dictionary lets you create your own spelling lists. The program, at $59.95, supports a large number of word processors and contains a custom installation program to accommodate most others. (Simon and Schuster, 1230 Avenue of the Americas, New York, New York 10020, (212) 245-6400.)

WHOOPS! Real-Time Speller ($49.95), manufactured by Cornucopia, is another spelling checker worth asking for. (Cornucopia, 1625 Beverly Pl., Berkeley CA 94707, (415) 524-8098.)





Computer Wear

CompuTogs

▲ If you put stylish, custom-fit dustcovers on your toaster, blender, and Cuisinart, why not also pamper the machine that really puts the food on the table! Here's your chance to dress up your computer with a new designer winter wardrobe. The CompuTogs company offers a hand-stitched natural canvas dustcover with snazzy brown binding for $24.95, embroidery extra. (CompuTogs, P.O. Box 2493, Naperville, IL 60540, (312) 961-2958.)

Avoiding Disaster

The Norton Utilities

▼ No other single piece of software has tackled disaster and triumphed as many times as *The Norton Utilities*, the best insurance you can have for a year of healthy data. *The Norton Utilities* include a number of programs to help you explore and recover data from damaged disks or accidentally erased files. Other programs in the utilities are organizational tools to facilitate wise disk management. A disk directory program sorts and arranges file directories for easy access. A file attribute program controls read-only and archive attributes.



The famous UnErase program, which allows the restoration of erased files and the repair of damaged files, has become a harbor of security in a sea of tenuous data. Version 3.1, available this November for $99.95, will handle large hard disk systems and offer a text search that is faster than ever. Available from computer dealers or Peter Norton, 2210 Wilshire Blvd., Santa Monica, CA 90403, (213) 399-3948.



The Keyboard to Success

Key Tronic KB 5153 Touch Pad

▲ A newfangled product from Key Tronic is a PC AT-style keyboard with a built-in touch-sensitive pad. The pad, with its supplied stylus, operates in a number of modes. In cursor mode, you can use the touch pad to speed up your cursor movement. In mouse mode, you can use the pad the way you'd use a mouse. Function mode lets you define areas on the pad to represent certain user-defined functions. (Templates are supplied for *1-2-3* and DOS.) An absolute coordinate mode is used for CAD systems, and a concurrent mode lets you combine the function mode with any one of the other modes by splitting the touch pad into component squares. The keyboard retails for $399.95 and is IBM PC, XT, and AT compatible. (Key Tronic, P.O. Box 14687, Spokane, WA 99214, (509) 928-8000.)

Removable Disk Storage

Iomega Bernoulli Box Disk Drive

► This year's edition of the Bernoulli Box will take up much less space under your Christmas tree than previous models. The newest high-performance removable cartridge disk drive from Iomega Corporation measures a mere 6 by 12½ by 15 inches, or roughly half the size of the older model. If Santa waits just long enough, the even-newer double-density version will be ready to load into his sleigh for approximately $4,540 plus the price of whatever adapter card you buy; the standard adapter, PC2, costs $155 and the bootable PC2B (for the COMPAQ or IBM PC) is $255. It holds a whopping 20 megabytes per cartridge (versus the current 10 megabytes), which makes it capable of backing up the entire Winchester disk in the Enhanced AT. (Iomega Corp., 1821 W. 4000 St., Roy, UT 84067, (801) 778-3000.)





The Sophisticated Traveler

Disk Caché and Disk Attaché

▲ Transport your disks in high style with ComputerScooter's Disk Caché. This beautifully crafted leather portfolio has two pockets that hold up to five disks each. The Disk Caché is available in brown, black, and burgundy, and you can protect your disks with antistatic lining ($90) or, for the frequent flier, lead lining that shields your data from airport X rays ($125). ComputerScooter is currently supplying the Disk Caché stuffed with ten free double-sided, double-density disks. (ComputerScooter, 256½ Ninth St., Jersey City, NJ 07302, (201) 659-3113.) Another classy disk carrier, the Disk Attaché, is available from Herrington Co. for $49.95. (Herrington Co., 10535 Chillicothe Rd., Kirtland, OH 44094, (216) 256-1446.)

Colored Disks

Rainbow Diskettes

▼ Your paper files are color-coded. The screen displays for your spreadsheets and word processor are color-coded. You've finally got up the nerve to break with the tradition of drab pastels and put some primary colors in your workspace. What's next? How about your floppy disk collection. Perk it up and organize it with Rainbow Diskettes, premium 5¼-inch disks in packs of ten, each a different color and each certified to be error free. Ten double-sided, double-density disks cost $24.95; ten high-density disks, $39.95. (Herrington Co., 10535 Chillicothe Rd., Kirtland, OH 44094, (216) 256-1446.)



Banishing Electrical Demons

System Controller

▼ Electrical blinks, spikes, and noise are the gremlins of personal computing and can destroy data and corrupt printed circuitry. The System Controller from Dynatech protects your PC from disruptive power surges and blinks. It also provides an attractive master power switch to let you instantly power your system up or down using a single button.

The surge protection component guards against power dips, brownouts, and power surges and also filters RFI/EMI noise and static. It provides a clean shutdown of power in the event of irregular voltage. The controller component sequentially turns on and off all system components. Attractive visual indicators tell you that your system components have been sequentially activated. The System Controller retails for $139.95. (Dynatech Computer Power Inc., 4744 Scotts Valley Dr., Scotts Valley, CA 95066, (800) 638-9098.)



Cleaning Up Your Act

Screen Clean Kit

▲ Is your screen so dirty that your coworkers leave you messages sketched in the dust? Don't risk scratching the surface by cleaning it with a paper towel or leaving lint with Kleenex. Clean up your act with the Screen Clean Kit. For $14.95, it includes an optical-grade cleaning solution, 100 lint-free, nonscratching wipes, and a Pocket Dust-Off for blowing dust from the screen, the keyboard, or any hard-to-reach part of the system. (Herrington Co., 10535 Chillicothe Rd., Kirtland, OH 44094, (216) 256-1446.)



The Cable with Something Extra

Smart Cable

Whoever said the RS-232 serial interface was a standard connection ought to take a second look. In a world of idiosyncratic data communications, Smart Cable surfaces as a user's magic link. Connect the universal serial-port Smart Cable from your computer to any peripheral, and it can automatically analyze the communications needs of both. The cable, with its plug-in module unit, contains five LEDs situated next to two switches. Adjust the switches to the positions indicated by the diodes, and the cable automatically connects all data, control, and handshaking lines in the proper configuration. The logic in the module determines which pins need to be connected to which other pins and makes the proper connections. The module, at $89.95, comes with either a male or female output connector. (IQ Technologies Inc., 11811 N.E. First St., Bellevue, WA 98005, (206) 451-0232.)



Be Kind to Your Eyes

Dysan Precision Screen

▲ Screen glare can turn even the most complacent PC user into a red-eyed, aspirin-gobbling monster. The Dysan Precision Screen is an anti-glare screen that reduces glare and enhances contrast. The screen, made of a nylon micro-mesh, comes in two flavors: monochrome and color. (The screen for a color monitor is made of a finer mesh, and the mesh is run diagonally.) The mesh is laminated between two pieces of high-impact plastic, preventing the screen from sagging.

The Dysan Precision Screen is available in five custom sizes (IBM Color, IBM monochrome, COMPAQ portable, Amdek Color Monitor, and Princeton Graphics); all are low-profile and snap unobtrusively into place. Four universal-size screens are also available to accommodate other monitors, and adhere with velcro and double-sided tape. Both Monochrome Precision Screen ($29.95) and Color Precision Screen ($34.95) come supplied with their own cleaning cloth. (Dysan, 5100 Patrick Henry Dr., Santa Clara, CA 58053, (800) 233-5099.)



Creating a Font That's Your Type

Fontrix 2.5

◀ Printer utilities can add pizzazz to humdrum copy. *Fontrix 2.5*, a powerful one at an affordable price, sets up a virtual (larger than the screen) graphics workspace for you to create your masterpieces. You can choose from a library of fonts (11 fonts come with the package and others are available in $25 FontPacs) and then enhance them with boldface, italic, rotations, and even inverses. A graphic component lets you draw and paint boxes, circles, and elastic lines. *Fontrix* uses the 320 by 200 four-color IBM bit map, but you can generate 96 different foreground and background color patterns. All choices are made through pull-down menus that are invoked by certain control-key commands. *Fontrix 2.5* sells for $155 and supports most PC-compatible printers.(Data Transforms, 616 Washington St., Denver, CO 80203, (303) 832-1501.)

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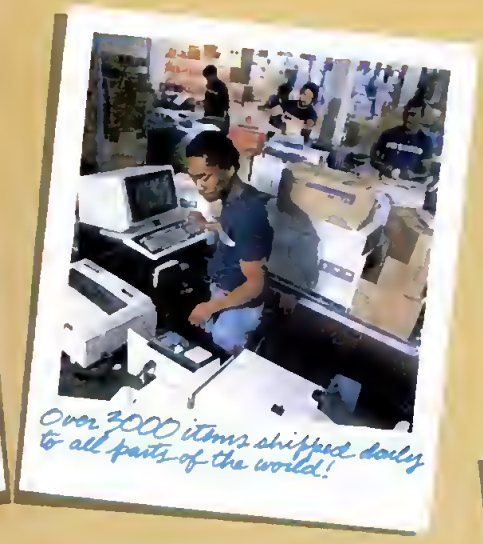
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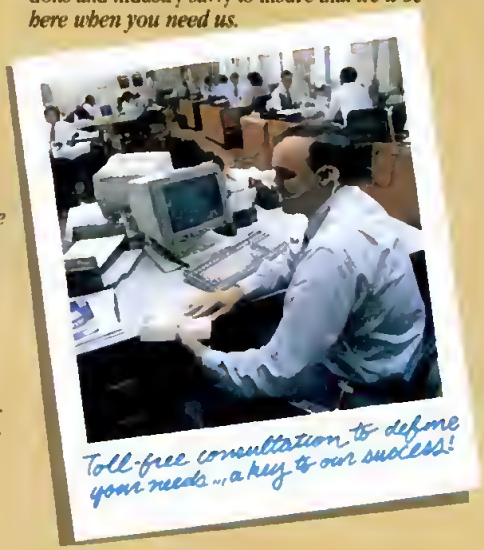
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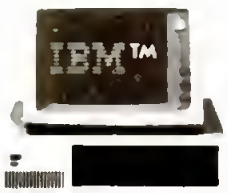
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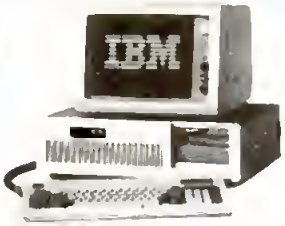


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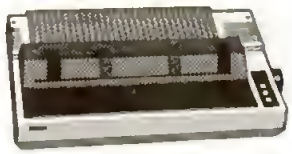


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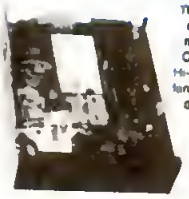
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Ryan McFarland *RM COBOL (Dev. System)*	520.00*
▶ **Samna** *Word Processor*	340.00*
Satelite Software *Word Perfect*	180.00*
Softcraft *Fancy Fonts*	125.00*
Softstyle *BESTseller*	35.00*
Software Group *Enable*	365.00*
Software Publishing *PFS: File, Write, Graph*	89.00*
Software Publishing *PFS: Report*	64.00*
Sorcim	189.00*
Xenaro	262.00*

HARDWARE

(Please add shipping and handling charges found in italics next to prices.)

COMPLETE SYSTEMS

Apple *Macintosh Base System*	CALL
Apple *Apple IIc*	CALL
Apple *Apple IIe*	CALL
AT&T *6300 PC CPU2*	$1,575.00* (... 4
128A 2 Floppy 1 Serial/1 Parallel	
Columbia *Desktop & Portable Systems*	CALL
▶ **COMPAQ** *Hard Disk Portable*	2,235.00*
10MB Hard Disk, 1 Floppy/256K	
COMPAQ *DeskPro Tape backup System*	2,951.94* (63.70)
w/ 640K, 1 Floppy/10MB Hard Disk/ 10MB Tape Drive/ Modem	
▶ **IBM** *Base System w/2... COMPACONSOLE*	1,495.00* (32.50)
▶ **IBM** *PC Professional Hard Disk*	1,749.00* (37.75)
IBM *AT Air Conditioned*	CALL
IBM *AT Base Unit — 1.2MB Floppy/256K*	2,795.00* (60.37)
Texas Instruments *Professional*	CALL

DISK DRIVES & CONTROLLERS

IOmega *Bernoulli Box Dual 10MB Drives*	$2,250.00* (47.50)
Maynard *Maynstream System 70 w/ ... LR Fixed/Removable 10MB Tape Backup System*	879.00* (18.99)
Panasonic *Half Height DS/DD Drive Pair*	145.00* (3.00)
▶ **PC Network** *1.2MB Half Height Internal Drive, Controller, Cables, New Version 3.0 Drivers, Shipped*	330.00* (7.15)
▶ **PC Network** *20MB Half Height Internal Drive, Controller, Cables, New Version 3.0 Drivers, Shipped*	429.00*
PC Network *10MB Tape Internal Same Unit as the Compaq's DeskPro*	469.00* (9.94)
▶ **PC Network** *Full Height Quad Drive*	58.00* (1.00)
Tallgrass *42MB Exchange Hard Disk with 60MB Tape Backup*	2,378.00* (51.30)
▶ **Tandon** *TM100-2 Dual Height DS/DD Drives*	83.00* (2.30)
▶ **Teac** *FD 55 B Half Height DS DD Drives*	90.00* (1.94)
▶ **Teac** *1.2MB High Height Disk Drive for AT*	180.00* (3.40)

MEMORY CHIPS

All chips guaranteed first rate

▶ **64K Memory Upgrade Kits**	$ 5.00* (1.00)
▶ **64K Dynamic Ram Chips**	.60* (.02)
▶ **256K Dynamic Ram Chips**	2.00* (1.00)
▶ **128K AT Mother Board Chips** (Each)	5.00* (1.00)

MODEMS

▶ **Anchor** *Signalman Express*	$ 295.00* (5.00)
Hayes *Smartmodem 300*	125.00* (5.00)
▶ **Hayes** *Smartmodem 2400*	535.00* (5.00)
LATEST IN COMMUNICATION TECHNOLOGY!!	
Hayes *Smartmodem 1200B with new Smartcom II VT100 Emulator*	317.00* (2.50)
Hayes *Smartmodem 1200B Alone*	269.00* (2.50)
Hayes *Smartmodem 1200*	356.00* (5.00)
Prometheus *Promodem 1200*	278.00* (9.00)
Extreme 100% Hayes Compatible	
▶ **U.S. Robotics** *Password*	195.00* (4.00)
LOW PRICE 1200BPS Modem!	
▶ **U.S. Robotics** *Courier 2400 PC Modem*	495.00* (5.00)

MONITORS

Amdek *Video 300G Composite Green*	$ 110.00* (3.00)
Amdek *Video 300A Composite Amber*	120.00* (3.00)
Amdek *Video 310A IBM Type Amber*	130.00* (3.00)
Amdek *Color 300 (NEW!) Composite*	215.00* (4.64)
Amdek *Color 600 (NEW!) High Res RGB*	365.00* (7.98)
Amdek *Color 700 (NEW!) Ultra High Res*	495.00* (9.83)
Amdek *Color 710 (NEW!) 700 w/Non Glare Long Phosphor*	475.00* (10.48)
Princeton *HX 12 RGB Monitor*	CALL
Princeton *MAX 12E*	CALL
Supports Either Mono or RGB Cards	
Princeton *SR 12 Ultra High Res RGB*	CALL
▶ **Quadram** *Quadchrome II NEW! 640x200 RGB w/14" Screen, Black Phosphor Mask/IBM Case*	395.00* (7.56)
▶ **Samsung** *12" TTL IBM Type Amber. A great looking/performing monochrome from the manufacturer of IBM's own color monitor*	85.00* (5.00)
Taxan *440 Highest Res RGB (720x400) Currently Available Works With Persyst Bob Card*	495.00* (10.68)
Zenith *ZVM-1230A Green High Res/Non Glare*	$1.00* (2.50)

MULTIFUNCTION CARDS

Apparat *A+ Rem... ...ion card*	$129.00* (2.50)
▶ **AST** *Six Pack Plus 64K*	195.00* (2.50)
AST *... II*	120.00* (2.50)
AST *Advantage for AT*	355.00* (2.50)
▶ **PC Network** *... Memory Board, 0K*	89.00* (2.50)
▶ **PC Network** *... Card, 0K*	89.00* (2.50)
... Standard	
... a Fabulous Price	
... Guarantee	
▶ **PC Network** *...*	89.00* (2.50)
Quadram *Improved Quadboard W/0K*	179.00* (2.50)
▶ **Tecmar** *Captain Multifunction ... 0K*	149.00* (2.50)

PRINTERS

▶ **Citizen** *MSP-10 NEW 160CPS 80COL Enhance Tractor*	$ 265.00* (5.72)
▶ **Citizen** *MSP-15 NEW 160CPS 132COL Enhance Tractor*	350.00* (7.56)
▶ **Citizen** *MSP-25 NEW 200CPS 132COL Enhance Tractor*	499.00* (10.76)
▶ **Epson** *LX-86 100CPS*	199.00* (4.30)
▶ **Epson** *FX*	309.00* (6.49)
▶ **Epson**	429.00* (9.27)
Epson	799.00* (17.26)
	1,350.00* (29.35)
Epson	569.00* (12.29)
▶ **NEC**	645.00* (13.00)
▶ **NEC** ... *LQ Printer*	849.00* (18)
▶ **NEC** ... *Quality Printer*	929.00* (20.07)
▶ **NEC** ... *P6 Printer*	1,330.00* (28.)
▶ **Okidata** *Microline 182 NEW 160CPS/NLQ*	299.00* (4.3.)
Made With IBM Graphics Mode	
▶ **Okidata** *Microline 192 NEW Super Dot Matrix 160CPS/NLQ 10 Megabyte/IBM Graphics*	389.00* 7.02
▶ **Okidata** *Microline 193 NEW Super Dot Matrix 200CPS/NLQ Wide Carriage/IBM Graphics*	499.00* (9.83)
▶ **Okidata** *Pacemark 2410 NEW 300CPS/NLQ Color Printer*	799.00* (17.26)
Made With IBM Graphics Mode	
Qume *Sprint 11 40 300CPS/NLQ Letter Quality*	1,195.00* (24.30)
Qume *(IBM cable and interface required)*	72.00* (1.00)
▶ **Taxas Instruments** *855/DP LQ w Tractor*	679.00* (14.70)
Toshiba *P1340 80COL/144 CPS*	464.00* (10.72)
Toshiba *351 New 288CPS 132COL*	575.00* (21.06)

VIDEO CARDS

Hercules *Color Card w Parallel Port*	$ 142.00* (2.50)
▶ **Hercules** *Monochrome Graphics Cards*	283.00* (2.50)
Paradise *New Modular Graphics Card*	236.00* (2.50)
▶ **PC Network** *Hercules Mono Card Clone*	89.00* (2.50)
IBM Compatible!	
▶ **PC Network** *Color Card*	89.00* (2.50)
Persyst *Bob Card Ultra High Res Color*	299.00* (2.50)
Call For High Quality Text in Color	
▶ **STB** *Graphix Plus II NEW! (Simultaneous Mono Graphics & Color)*	149.00* (2.50)
STB *The Chauffer Color & Mono Card*	239.00* (2.50)
Runs Color Software in Monochrome with No Special Drivers!	

ACCESSORIES AND SUPPLIES

▶ **Brand Name DS/DD Diskettes** *Guaranteed for Life! Not Generic*	$ 0.99* (1.00)
▶ **DS/DD Bulk Pack Special** *Packaged in 50 with sleeves and labels Guaranteed for Life!*	.59*ea.
▶ **PC Network** *Replacement 130 Watt IBM PC Power Supply — Gives your PC (Old or New) the same capacity as an XT. Good for add-in tape drives (without need for a piggyback unit) and large capacity disk drives.*	82.00* (2.70)
SMA *PC Documate — Keyboard Templates for Lotus/DBASE/ Multimate and others (Each)*	5.00* (1.00)
Sony *DS/DD Diskettes*	15.00* (1.00)
Sony *AT High Density Diskettes*	30.00* (1.00)
WP Printer Paper *2600 Sheets Microfine Perfs (invisible when torn)*	17.00* (10.00)

*PC NETWORK Members pay just 8% above the wholesale price, plus shipping. All prices reflect a 3% cash discount. Minimum shipping $2.50 per order. International orders call for shipping & handling charges. Personal checks please allow 10 working days to clear. All prices subject to change.

†RENT BEFORE YOU BUY — Members are eligible to join The NETWORK's Business and Game Software Rental Libraries and evaluate products for a full 14 (Regular) or 30 (VIP) days to see if it meets your needs. And The NETWORK's rental charges are far less than other software rental services — JUST 20% OF THE MEMBER WHOLESALE PRICE. **We feature over 1,000 available titles in IBM/Apple/MAC and CP/M Formats.** Hardware prices highlited by ▶ reflect recent major price reductions

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2 OUR 600 PAGE WHOLESALE CATALOG — Members receive our 600 page wholesale catalog containing over 30,000 hardware and software products for the *IBM PC, APPLE* and over 50 other popular computer systems. **THE NETWORK'S CATALOG IS THE LARGEST SINGLE COMPILATION OF PERSONAL COMPUTER PRODUCTS AVAILABLE TODAY. NOW UPDATED QUARTERLY!**

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7 FREE TECHNICAL SUPPORT — The NETWORK supports every product it sells. Our qualified TECH-SUPPORT staff will help you assemble your system, interpret vendor documentation and get your software and hardware to work. **WE WILL GIVE YOU ALL THE HELP YOU NEED, WHEN YOU NEED IT — FREE!**

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†9 OPTIONAL GAME SOFTWARE RENTAL LIBRARY — The Game Rental library is available to members for just $10 PER YEAR and permits evaluation (or just enjoyment) of any game or educational software product as above.

10 SPECIAL SAVINGS BULLETINS — THE PRINTOUT — Issued Quarterly at no charge to Network members only! The Printout contains all the New Product listings and price changes you need to keep your Catalog up to date. Also, we buy excess dealer inventories, and store bankruptcy closeouts, which we turn around and make available to our members at fantastic savings via *THE PRINTOUT.*

11 DISCOUNT BOOK LIBRARY — Working with numerous publishers and distributors, The NETWORK has assembled a library of over 1000 computer related books and manuals at savings of up to 75% from the normal store price.

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13 CORPORATE ACCOUNT PROGRAM — Almost 50% of The NETWORK's members are corporate buyers and users *(see opposite page left).* The NETWORK can establish open account status and assign designated account managers to expedite orders, and coordinate multiple location shipments.

14 QUANTITY DISCOUNTS — For large corporations, clubs, and repeat or quantity buyers The NETWORK can extend additional single order discounts, when available to us from our manufacturers and distributors.

15 PRICE PROTECTION — The PC Industry is crazy!! Prices change not yearly or monthly or even weekly but often day by day! These changes are sometimes up *but are mostly down!!!* **THE NETWORK GUARANTEES THAT IN THE EVENT OF A PRODUCT PRICE REDUCTION, BETWEEN THE TIME YOU PLACE YOUR ORDER AND THE TIME THE PRODUCT SHIPS YOU WILL ONLY PAY THE LOWER AMOUNT!!**

PC NETWORK GOES TO THE

ORIENT DIRECT

How do you suppose most manufacturers of personal computer products get started?

They go to the Orient... taking either their designs or simply their ideas to one or more of the major electronics manufacturing concerns, getting bids for making these devices under contract to the creators. Multifunction Cards, Video Cards, Disk Controllers, Modems and I/O Boards all begin their life in this way

This relationship between the manufacturing capabilities of the East and the design and marketing talents of the U.S. has resulted in the incredible selection of enhancement products for the IBM and Apple computer markets.

Well, with 100,000 members and growing strong, The Network sent *its* buyers east to visit some of these manufacturing concerns to check out the feasability of directly importing these products in the necessary volumes to *save our members money!* What they came back with was astounding.

Now, we always figured that there were some pretty substantial markups as these boards came into the country and got fancy boxes and marketing promotions under any one of a number of well known brand names in the peripheral add-on markets *but we had no idea they were so large!*

To prove our point, consider what they brought back. Each board is constructed to the same precise specifications, on exactly the same machinery as their name-brand duplicates. The difference? *As a Network member, you pay only 8% over our unusually low wholesale price... and you get our full 1 year warranty!*

Hercules' Smarter Brother

A Monochrome Graphics Card with Printer Port... 100% compatible with Hercules product...

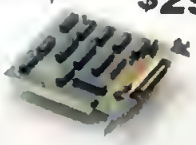


Wholesale price...
$99.00*

Graphics Printer Interface

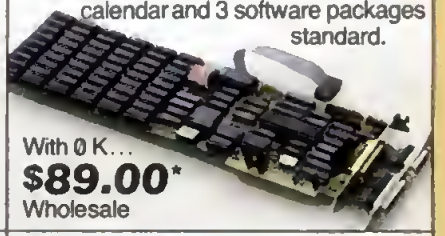
If all you want is a printer, this is the card for you. Supports all text and graphics printer features.

Wholesale price... **$29.00***



The "9" Pack Plus

Multifunction like the AST "6" Pack... up to 384Kb of expansion memory, 1 serial, 1 parallel, and 1 game port, a clock/calendar and 3 software packages standard.



With 0 K...
$89.00*
Wholesale

IBM Color Card

100% compatible with the IBM offering. The wholesale price?

A mere **$69.00***



The I/O Double Plus

If you don't need memory—just ports, identical I/O board to the AST I/O+ with 2 serial, (1 standard) 1 parallel, 1 game port and clock/calendar with software.



Wholesale price...
$69.00*

512 K Memory

The least expensive way to add memory to your current system. With 0 K installed.

Wholesale priced at only...
$69.00*



Watch our Network ONLINE listings for new products in this ORIENT DIRECT line for the Apple *II* and IBM AT computer families.

*PC NETWORK Members pay just 8% above this wholesale price, plus shipping. All prices reflect a 3% cash discount. Minimum shipping $2.50 per order. International orders call for shipping & handling charges. Personal checks please allow 10 working days to clear

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PC NETWORK

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Simulating Halley's Comet

Halley PC Planetarium

◀ Every 76 years for the last 2,000, stargazers all over the world have been observing and documenting the presence of Halley's Comet. That's why *Halley*, $34.95 from Starsoft, is the perfect gift for comet enthusiasts with PCs. *Halley* is a series of menu-driven, graphics-oriented programs that predict the position of the comet and the appearance of its tail. The program can simulate how the comet moves through the solar system, with both heliocentric and geocentric views. Amateur astronomers wishing to pinpoint the comet's location by right ascension and declination will relish the program's calculation of astronomical coordinates. As news of last-minute changes in the comet's orbit become available, you can modify the program accordingly so the calculations are constantly more accurate. (Starsoft, P.O. Box 2524, San Anselmo, CA 94960.) Light Software offers a similar product, *PC Planetarium* ($52.00) (369 Pine St., San Francisco, CA, 94104 (415) 788-4578.)

A Printer Under Every Tree

Apple Laser Writer

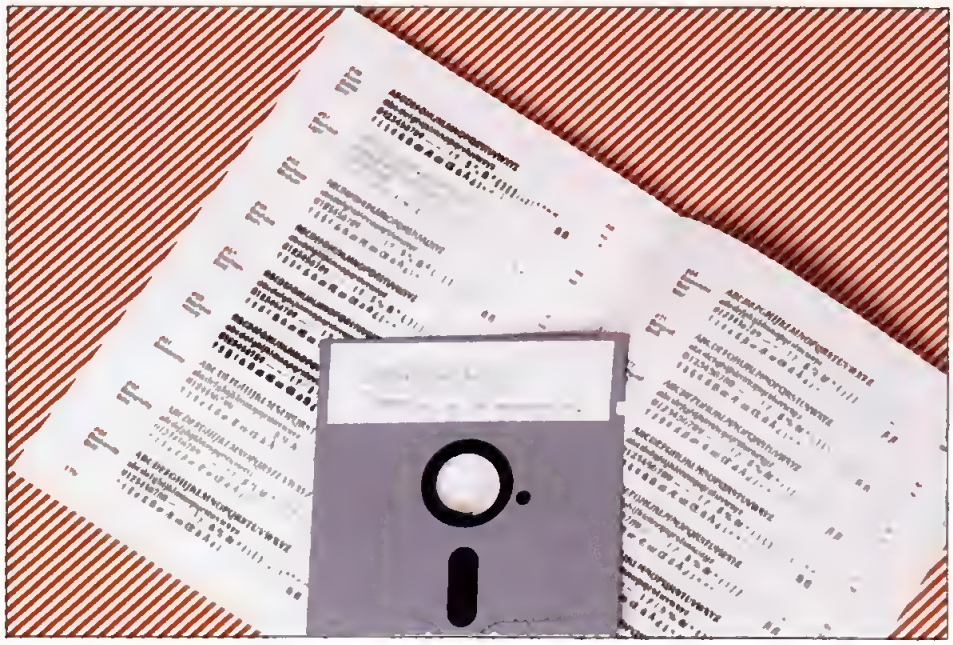
If the only way you can afford an Apple LaserWriter is to convince Santa Claus to bring you one, be sure to put the king of PC laser printers on your Christmas list. LaserWriter support is currently available from *Microsoft Word*, Version 2.0, for word processing; other IBM PC software vendors are actively developing LaserWriter interfaces for their programs. By the time your Christmas turkey is a bellyful of fond memories, you should have no trouble finding a variety of software for the LaserWriter. (Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014, (408) 996-1010.)

Contributing editor Robin Raskin and PC Magazine *staff members John Dickinson, Greg Pastrick, and Paul Ross contributed to this article.*

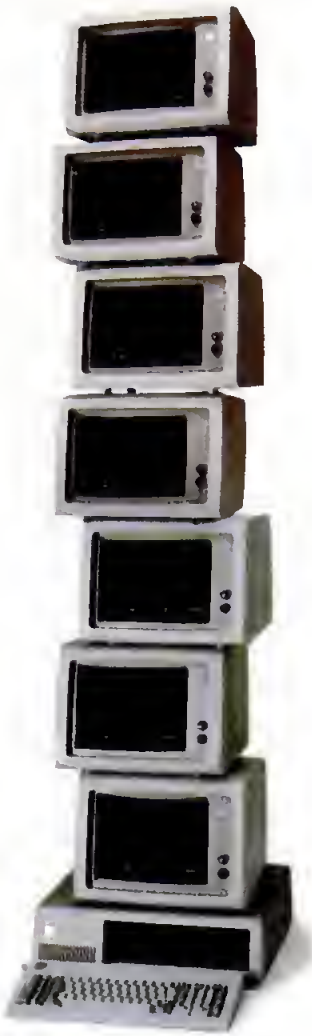
From Disk to Typeset Document

Intergraphics

▼ Intergraphics has done for electronic typesetting what FotoMat did for developing film—one-day service turns your personal computer text files into reproduction-quality typeset copy. You pay $18 for the Intergraphics guidebook, which details the typesetting commands you will insert within your text files. A $25 membership fee opens your personal account with Intergraphics. After that, you either ship the disk itself or telecommunicate your text files directly to the Intergraphics typesetting machinery. The cost of the service is $2 per thousand characters, and you may choose from 200 Merganthaler library typefaces. (Intergraphics, 106A S. Columbus St., Alexandria, VA 22314, (703) 683-9414.) ■



Multiple Host Sessions—Up To 7 Combinations of Displays and Printers—Simultaneously (Available Only On AST-5251/11 Plus)





Multiple Printer Sessions, Including 5256, 5224 and 5225 Emulation On PC-attached Printer

Programmable Printer Format Configuration





Bidirectional File Transfer

Automatic Sign-On With Password Security





Display Attribute Configuration

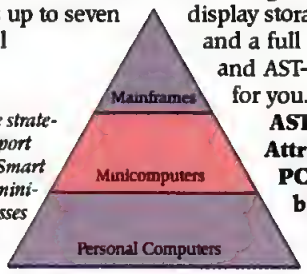
Build Your Smart Office The Smart Connection™ For

Loaded with the sophisticated features you need, we've just made our original AST-5251/11 even easier to use and more efficient for increased user productivity, and introduced an enhanced version too—AST-5251/11 Plus.™ Now you have lots of new reasons to make AST "The Smart Connection" for your evolving smart office.

Office Smarts—We've Got Them. At AST we've been building solutions for IBM® PC connectivity—the foundations of smart offices everywhere—long before it was a popular concept. You might say, with the over one million AST PC enhancements installed, over 20,000 PC to System 34/36/38 connections and the thousands and thousands of PC to IBM mainframe and local area network gateway connections we've established worldwide, that we've already made a substantial commitment to helping people realize their fundamental visions of the "smart office."

AST-5251/11—The Direct PC To 34/36/38 Connection. Standard twinax cable, just like IBM's, makes this connection the most convenient for you. Our Hot-Key support provides a toggle between PC DOS and two host sessions. And our new enhanced version, AST-5251/11 Plus, even allows up to seven System 34/36/38 sessions—all concurrently.

AST's family of smart connections are strategically focused and developed to support and evolve in concert with the IBM Smart Office architecture. Highlighting the minicomputer group here, AST also addresses connectivity in mainframe and personal workstation environments.



Our file transfer system means you can move host data to and from your favorite PC application software files, like Lotus® 1-2-3,® WordStar® and dBASE.™ For easy integration of PC and host applications, we've included our Applications Program Interface (API).

Add all our features illustrated above—everything from bidirectional file transfer to automatic 34/36/38 sign-on with password security, multiple printer support including 5256, 5224 and 5225, snapshot display storage, keyboard mapping help, and a full line of companion products—and AST-5251/11 really spells smart for you.

AST-5250/Display™—Model 11 Attributes and Standard IBM PC Monochrome Display Capabilities. Used with your AST-5251/11 card, the AST-5250/ Display makes your PC's

AST-5250/Display Products For Full Model 11 Display Attributes And PC Compatible Graphics



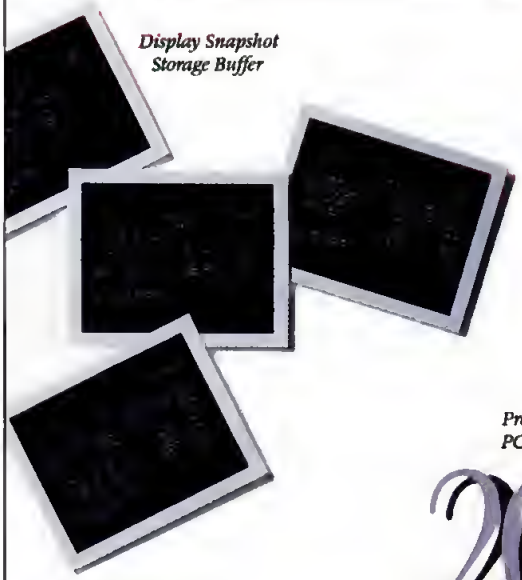
User Definable Keyboard Mapping



Displayable Keyboard Map of Program Control Keys



Display Snapshot Storage Buffer



Proven In More Than 20,000 Direct And Remote PC to System 34/36/38 Connections Worldwide

20,000

Even More Features

AST-5251/11 Plus or AST-5251/11
- Plugs into PC/XT/AT and compatibles, connects to System 34/36/38 via twinax cable and supports cable thru
- Emulates 5251-11, 5291 or 5292-1 display terminal
- Upgrade Kit for AST-5251/11 to AST-5251/11 Plus
- Selectable DMA and I/O interrupt channels
- Application Program Interface (API) included
- Supports fixed or hard disk
- Hot-Key assist for concurrent PC and multiple host sessions
- IBM FSU compatibility (for virtual disk support on the System 34/36/38)
- Third Party Software support, including ASTLink by Fuston,® Laguna Laboratories' DecisionLink™ and The BOSS® by TenMan Systems
- Complete package includes hardware, software, twinax cable assembly & user manuals

AST-5250/Display
- Used with AST-5251/11 brings full IBM 5251 Model 11 character and text display attributes to your IBM monochrome display
- Provides standard IBM PC & IBM 5251/11 monochrome display capabilities & a parallel printer port
- Hercules compatible high-res bit mapped graphics interface
- Automatically switches from 5251/11 display to PC display mode without operator interaction

AST-5250/Display-C
- Used with AST-5251/11 brings IBM 5292 Model 1 display attributes to your PC's color display
- Provides compatibility with IBM PC Color Graphics Adaptor with full-spectrum color capabilities
- Includes parallel port
- Automatically switches from 5292 Model 1 display to PC display mode without operator interaction

AST-5251/12
- A total solution for remote PC/XT/AT/Portable or compatible to System 34/36/38 communications in SNA environments
- PC emulation for IBM 5251 Model 12 terminal
- Host-addressable 5256 printer support on PC-attached printer
- Applications Program Interface (API) allows integration between host and PC applications
- Includes hardware, software and comprehensive user documentation

On AST-5251/11:™ Your PC to System 34/36/38

monochrome display look just like an IBM Model 11 display.

And it gives you high-resolution Hercules™ compatible bit-mapped graphics, high quality text and a parallel port.

Now PC 5251/11 emulation is even easier for you because you're working with a screen identical to IBM's. And you can take advantage of the graphics capabilities offered by today's software.

AST-5250/Display-C™—IBM 5292 Color Attributes and Standard IBM PC Color Graphics Too. Use this card with your AST-5251/11 and your IBM color monitor for all of IBM's 5292 screen text attributes. And some really colorful PC graphics—up to 16* sharp, vibrant colors on your standard 320 x 200 resolution monitor or up to four* on your 640 x 200 high resolution monitor.

Our color capabilities are completely compatible with your PC software favorites like Symphony,™ Graftalk,™ Business Graphics Systems™ and The Graphix Partner.™ There's also a parallel port to make printer and plotter connection easy and convenient.

AST-5251/12™—Remote PC to 34/36/38 Connections. For remote communications in SNA/SDLC environments, this complete hardware/software package lets you use your PC as a remote 5251 Model 12 terminal, and your attached PC printer is host-addressable to emulate a 5256 printer. Our Applications Program Interface also makes integrating host and PC applications easy.

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CIRCLE 104 ON READER SERVICE CARD

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THE HARDCARD
A 10-MEG MARVEL

Plus Development's Hardcard is an entire Winchester 10-megabyte hard disk subsystem on a single, easily installed PC expansion card. It's a miracle of miniaturization.

Fear of frying is the chief reason more people don't install a low-priced hard disk in their PC system units: They are afraid of incinerating expensive computer circuitry with a single slip of the screwdriver.

The Hardcard from Plus Development Corp. is aimed at appealing to all such electrophobes. An exemplar of the art of miniaturization, the Hardcard is a complete Winchester hard disk–based mass storage subsystem on a single expansion card. Slide it into any vacant slot in your PC, XT, or one of a few officially sanctioned compatibles—COMPAQ Portable, COMPAQ Plus, and AT&T PC 6300—and 10 megabytes await your electronic thoughts. The clever package lets you do things no other hard disk can, like keep both floppy drives in your PC or double the mass storage capacity of an XT without an expansion chassis.

The Hardcard is the electronic equal of the traditional hard disk and associated expansion card that are normally factory-fitted into the PC-XT. It will boot your system if drive A: is not ready with a floppy and can run all XT-compatible applications software and utilities.

If that's not enough to win you over, the Hardcard actually performs faster than the bulky original-equipment XT fixed disk drive. It's also quieter and sturdier. So sturdy, in fact, that it is particularly suited to portable and transportable computers. And it uses so little power you need not worry about the standard PC's 63.5-watt power supply running out of oomph.

No Surgeon or Software Needed

While to an engineer the most amazing aspect of the Hardcard would be its size, most people will find its installation case its most appealing feature.

The typical hard disk installation requires the dexterity of a surgeon, the mechanical understanding of a watchmaker, and a hefty dollop of software genius. Once you break into your system unit, you have to sling cables, pry panels off, squeeze in a drive unit that invariably seems a few millimeters too large, then screw everything down (but more often up), and issue a bunch of program commands that sound like the army roster from Middle Earth.

In contrast, installing the Hardcard is hardly more difficult than plugging in a multifunction card, a job easily within the range of anyone with the ordinary allocation of thumbs. Open your PC, slide the Hardcard into a vacant expansion slot, and close things up again. You don't need to worry about cables at all, and the only screw you have to deal with is the one securing the Hardcard in place.

Plus Development has also refined the software installation process to such an extent that you may think you have been shortchanged: Unlike almost any other hard disk system on the market, the Hardcard is not accompanied by a tag-along floppy disk full of software.

Plus has used two strategies to eliminate that floppy. The driver software, which makes your computer recognize that a hard disk is in your system and use it properly, is coded into a ROM chip resident in the electronics portion of the Hardcard. Utilities for installing DOS on the Hardcard and making everyday life with the system easier come already written on the hard disk itself. That means, of course, that the Hardcard is already formatted when you receive it—which means one less bother for you.

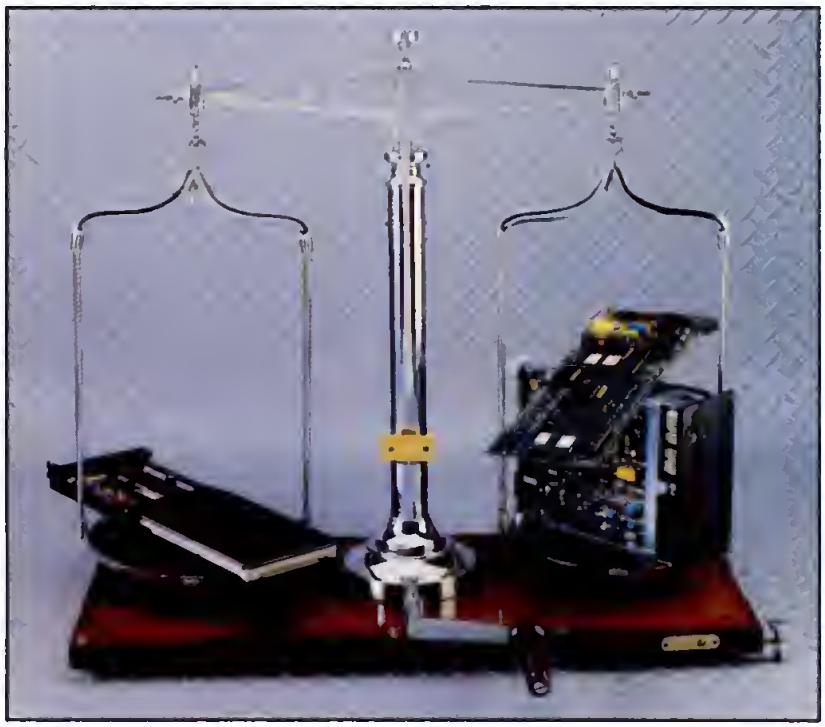
(This setup also means that the Hardcard will not function with some operating systems—in particular, XENIX.)

Software installation of the Hardcard involves running one batch file, which automatically handles DOS's FDISK and SYS utilities, and shuffling a couple of disks. You type INSTALL followed by the drive letter of your new hard disk; C: if it's the only hard disk in your system, D: if you've already got another hard disk. Instantly, the installation software takes over, mysteriously grinding files off your DOS disk and making its own backup copy of the software supplied on the Hardcard. (Because of copyright laws and other discouragements, Plus cannot include the DOS operating system on the Hardcard, hence all the associated programs must be copied from your DOS disk.)

The installation software reveals little of what it does; it posts messages that only indicate its progress (20 percent done, for example.) Right in the middle of the process, it seems to reboot the system—the screen goes dark and disk A: aimlessly spins for many seconds. It's disconcerting, but be patient. The machine will appear to die, but suddenly it will come to life and

post a new message.

Plus has evidently tried to make the installation software goof-proof. It checks and double-checks for the right programs in the right places so that nothing can go wrong. Unfortunately, all that checking militates against compatibility with some non-IBM systems. When I tried to install the Hardcard on a PC-compatible computer that Plus Development doesn't support, the software would not work properly. It needed to use PC-DOS's FDISK.COM program and would not accept the compatible's MS-DOS FDISK.EXE as a substitute. However, I did make the Hardcard work on the irrascible compatible by following the hard disk preparation instructions included with MS-DOS.



Surprise Software

The automatic installation requires about 10 minutes. When it is completed, your monitor displays a message advising you to reboot your system from your new Hardcard. If you do, you'll be in for a surprise after you type in the time and date. The Hardcard automatically installs its own menu-driven DOS shell, which allows you to run most normal business functions merely by making a selection and pressing a key.

The Hardcard does not, however, automatically install the rest of your software to run under menu command, but the Plus instructions and the on-line help included with the shell should be sufficient to get you started.

My favorite feature of the shell is its instant batch-file abilities. If you elect to issue DOS commands from the main menu, you can list a dozen different commands, which will be carried out in sequence. You can start your PC percolating and sneak away for a cup of coffee.

State-of-the-Art Miracle

As a piece of PC hardware, the Hardcard is a genuine little marvel. It uses the latest state-of-the-art technology to squeeze functions into a single card slot that 2 years ago would have required a drive slot, a drive-size set of electronics, and a separate disk controller expansion card in the space now occupied by the entire system.

The heart of the Hardcard is, of course, a tiny hard disk, 3½ inches in diameter. It's hermetically sealed in a metal chamber covered with black plastic at the end of the 14-inch, full-size expansion card closest to the front panel of the PC it is installed in. A tiny motor is tucked under the drive.

The resulting package is roughly 1 inch thick at its thickest, about the same width as slot spacing inside an ordinary PC. Of course, that thickness means the Hardcard would be more than a tight fit should you have an XT with narrower slot spacing ($^{8}/_{10}$ of an inch). Because the thickest part of the Hardcard is at the end farthest from the slot connector, you could plug a short expansion card into the XT slot located next to the Hardcard so as not to waste valuable expansion space.

Although you might expect the little platter in the Hardcard to be plated with a high-density, thin-film metal medium to cram as much capacity as possible onto its two surfaces, it is instead coated with an oxide compound. Plus Development made that choice because it needed a material with a reliable source of supply sufficient for millions of disks and with a short lead time for delivery.

To get greater storage density, Plus uses a form of data encoding called run length limited (RLL), which is more sophisticated than the modified frequency modulation (MFM) encoding used on double-density floppies and most hard disks. By doing little more than altering the pattern of digital 1s and 0s written on the disk, Plus is able to fit 50 percent more information onto the tiny surface of the Hardcard than would be possible with only MFM.

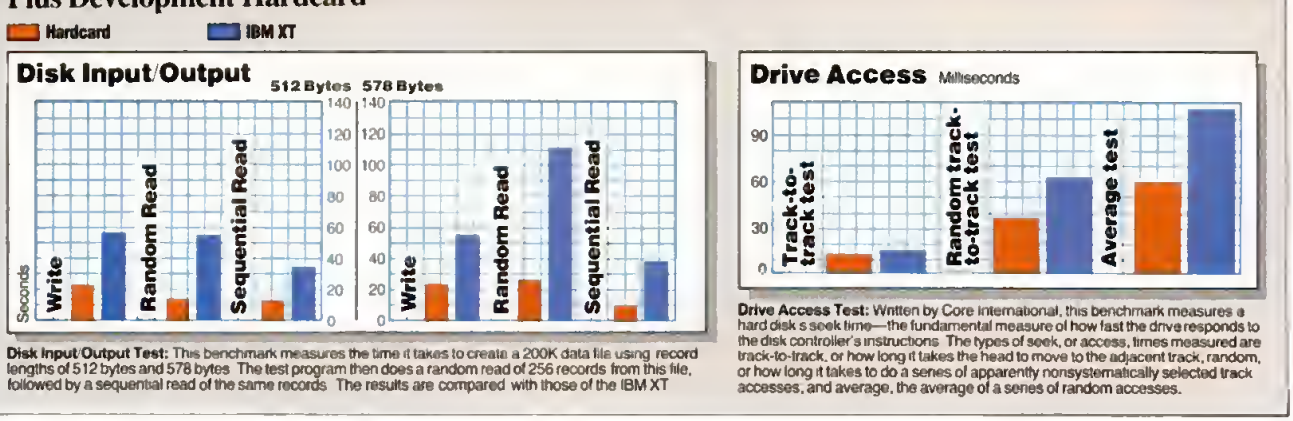
Although the Hardcard might have benefited from the greater sturdiness of a plated, thin-film magnetic layer, its head-crash protection seems to be more than adequate. In fact, when not in operation, the Hardcard is rated to withstand shocks of 100 g (a g is a measure of acceleration equal to that caused by gravity at the surface of the earth), about five times the design specification of the XT's hard disk and about three times that of the COMPAQ Portable computer. This sturdiness is partly attributable to the drive's genuine park-and-lock feature, which causes its read/write heads to retract and lock themselves outside the user data area when power is removed.

The Hardcard also claims extra shock resistance during operation, again exceeding the design specifications of both the PC-XT and COMPAQ Portable. In re-

Photograph: Vittorio Sartor

PC BENCHMARK

Plus Development Hardcard



Disk Input/Output Test: This benchmark measures the time it takes to create a 200K data file using record lengths of 512 bytes and 578 bytes. The test program then does a random read of 256 records from this file, followed by a sequential read of the same records. The results are compared with those of the IBM XT.

Drive Access Test: Written by Core International, this benchmark measures a hard disk's seek time—the fundamental measure of how fast the drive responds to the disk controller's instructions. The types of seek, or access, times measured are track-to-track, or how long it takes the head to move to the adjacent track, random, or how long it takes to do a series of apparently nonsystematically selected track accesses, and average, the average of a series of random accesses.

sponse to the standard malfunctioning-television shock test—a sharp rap to the system unit, about the equivalent of typical office abuse—the Hardcard continued to operate and gave no indication of hard or soft errors on the disk.

Squeeze Engineering

The balance of the Hardcard consists of control and system-adapting circuitry. Getting all those components normally appended to the bottoms of disk drives and on the controller card into a space little more than half the length of a card required considerable engineering finesse on the part of Plus Development Corp. The Hardcard exemplifies the best of today's technology: surface-mount components and large-scale integration (LSI) chips, mostly manufactured by NEC.

Surface-mount components are tiny little black epoxy flecks a few millimeters on a side, which are mounted by soldering them directly to circuit traces rather than connecting them with wire leads slid through holes. The mounting scheme and small size of the components can save a good deal of board space. On the Hardcard they save even more because they are mounted on the side opposite from the rest of the circuit components.

Plus Development was also able to substantially reduce the amount of circuitry required on the Hardcard by taking the bold and risky engineering step of irrevocably committing the Hardcard to the PC bus. Most hard disk controllers are designed to work with as many different computer systems as possible, but this universal compatibility requires a good deal of additional interface circuitry.

> If you were expecting to sacrifice anything for the installation ease of the Hardcard, it would probably be performance. But the Hardcard will surprise you.

Plus Development decided that the PC market and potential Hardcard sales were large enough to justify designing the product to fit PCs exclusively. To add further assurance that a high-quality product could be had in sufficient quantity, Plus Development is having the Hardcards manufactured by the consumer electronics giant Matsushita, the powerhouse behind the Panasonic brand name. Plus Development chose the Japanese giant to make the Hardcard because, as one of the largest makers of home videocassette recorders, Matsushita has the necessary experience producing precision electromechanical products in quantity. The result of these decisions is less required circuitry, lower costs, and lower power consumption.

Most of the electronic components on the Hardcard uses low-power-consumption CMOS (Complementary Metal Oxide Semiconductor) technology. The small disk, reduced component count, and electrically frugal CMOS chips make the Hardcard a power miser. It requires under 11 watts for normal operation, less than that of one of today's latest half-height, 5¼-inch low-power hard disks without its necessary support circuitry.

Low power means low heat dissipation and that, coupled with large-scale integration, means long life. In fact, Plus Development claims a mean time between failures of 25,000 power-on hours for the Hardcard, two to five times greater than that of most other hard disks.

No Small Performer

If you were expecting to sacrifice anything for the installation ease of the Hardcard, it would probably be performance. In the traditional scheme of things, bigger disks are faster, but the Hardcard will surprise you.

The Hardcard's data transfer rate, 5 million bits per seccond, should prove it

PC FACT FILE

Hardcard
Plus Development Corp.
1778 McCarthy Blvd.
Milpitas, CA 95035
(408) 946-3700
List Price: $1,095
Requires: DOS 2.0 or later; IBM PC, XT, COMPAQ Portable, COMPAQ Plus, or AT&T PC 6300.

CIRCLE 688 ON READER SERVICE CARD

the equal of nearly every other PC-based hard disk system.

And in the other important indication of disk speed, average access time, the Hardcard actually outperforms many more-traditional Winchester products. On Core International's DISKP hard disk performance testing program, the Hardcard scored an average access time of 60 milliseconds. Although that speed by no means meets the stringent specifications of the AT, it is substantially better than the 100- to 110-millisecond time turned in by the standard IBM-installed XT hard disk. As a result, a PC equipped with a Hardcard will race through disk-intensive tasks, like sorting through a database, substantially faster than an XT.

The On/Off Indicator

About the only thing you give up by installing the Hardcard instead of a conventional hard disk subsystem is a little red "drive activity" LED indicator. In a clever bit of engineering, Plus Development planted an equivalent indicator on the monitor screen. After the Hardcard is installed, a little plus sign (+)—pun intended, certainly—appears in the upper-right corner of the active monitor screen whenever the disk is in use. Should you find this indicator too distracting, you can turn it off with a software utility. If you prefer an audible indication that the disk is at work, another utility will turn one on.

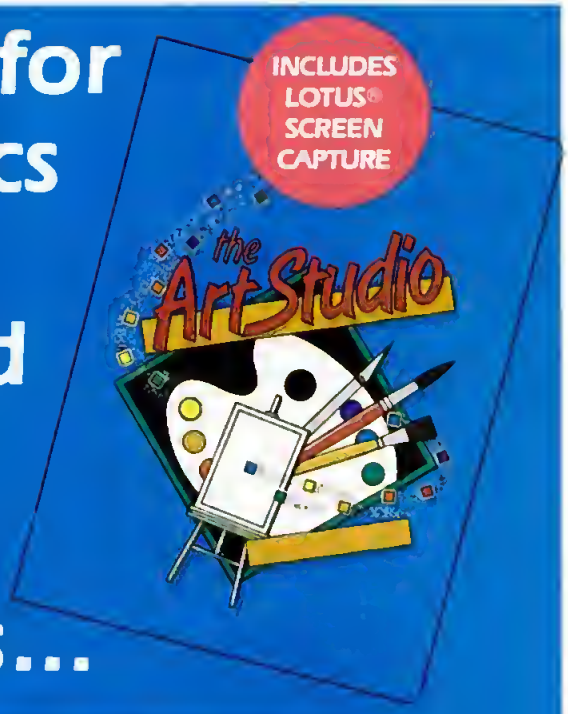
With the fear of frying your computer during installation eliminated, the only thing left to frighten you off adding the speedy mass storage of a hard disk to your system is price. At $1,095 from your dealer, the Hardcard fits neatly between the cheap mail order units ($500 or so) and traditional hard disk products from PC peripheral suppliers ($1,500 and up).

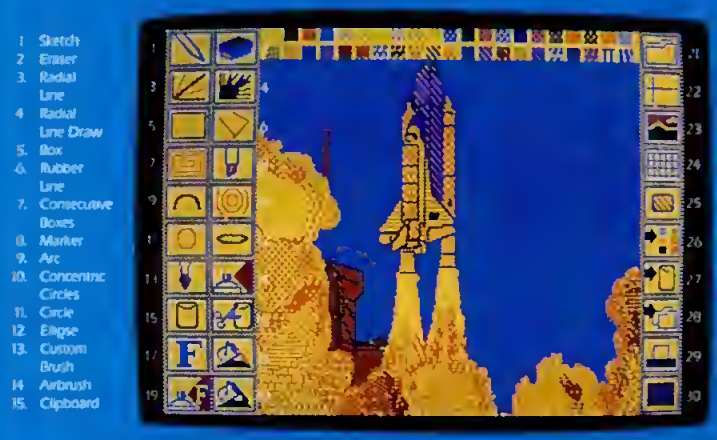
Although the Hardcard is not the least expensive way to add hard disk storage to your system, the extra dollars it costs pay for two things you might not want to do without: easy installation and dealer support. The Hardcard is a genuinely revolutionary product and one worth considering, if as nothing more than one more mass storage alternative. ■

Winn L. Rosch is a contributing editor of PC Magazine.

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APL

Daring to be Different

APL has built up quite a following in both the scientific and business communities owing to its ability to solve problems quickly without a lot of tedious programming chores.

In the universe of programming languages, APL is unusual in many respects. Its most obvious distinction is the way it looks: While nearly every other language uses the standard ASCII character set, APL's is radically different.

APL's following is also exceptional, in both its composition and its enthusiasm. Although APL's roots are strongly based in mathematics, its most devoted following is in the business community. While users of some languages are just beginning to hold occasional meetings, the APL community has been holding regional and international conferences each year for 15 years (often more than once a year). Each conference publishes roughly 300 to 400 pages of proceedings. The first special-interest group devoted to a language was SIGAPL (part of the Association for Computing Machinery).

The distinctive characteristic that most endears APL to its users is the way it works: Whereas other languages require management of every last piece of data, APL enables you to concentrate on solving your original problem. To paraphrase the old saw, some languages are part of the problem, and some are part of the solution.

What Makes APL Work?

A hallmark of APL is its ability to get applications up and running quickly. One reason for this efficiency is that an interpreter (no standalone compilers exist as yet) makes an ideal environment in which to shape an incompletely formed idea. You're not required to dot every last *i* and cross every *t* before testing can begin. More to the point, APL is very approachable. You learn only what you need at first and put it to use immediately, reinforcing what you've just learned. You're encouraged to make mistakes and experiment. It's amazing how few mistakes you'll make when the penalty for error is so low. To those who think of programming as suffering, APL is a welcome change.

Because of the extreme care put into its design, APL creates a complete and well-thought-out framework for its concepts. Its rules are general and applicable to new circumstances in a logical fashion. Once you learn how to add up a list of numbers, you also know how to find their maximum, minimum, and product. It has none of the epicyclic design of other languages, in which rules have exceptions that, in turn, have their own special cases. Equations with limits produce correct results, not surprises. Nowadays, multifaceted products are judged in terms of how seamless they are, and APL's design fully deserves that accolade.

Its philosophy is to assume the burden of programming details. The messy housekeeping tasks created by loops in other languages are often unnecessary in APL because an entire array can be manipulated as

a whole. You don't need to sum the numbers in a list by indexing each item and adding each to an accumulator—in APL, applying the sumbols +/ to the list returns the same result. Fred Brooks, author of *The Mythical Man-Month*, the classic tome on programming, said that programming in APL is like telling your child to bring back an apple from the basement. With other languages, you must say, "Open the basement door. Go down the stairs. Pick up an apple. If it's a bad apple, don't bring it up; and so on."

These are a few of the many reasons that APL has earned such a devoted following. In the continuous effort that goes into solving any programming problem, APL makes the radical assumption that *it* should bear the greatest burden. You can't help but warm up to a friend like that—it makes you look good.

PC FACT FILE



WATCOM APL
Watcom Products
415 Phillip St.
Waterloo, Ontario
Canada CD N2L 3X2
(519) 886-3700
List Price: $450
Requires: 192K RAM, one disk drive.

CIRCLE 692 ON READER SERVICE CARD



APL*PLUS PC
STSC Inc.
2115 E. Jefferson St.
Rockville, MD 20852
(301) 984-5123
List Price: $595
Requires: 192K RAM, one disk drive.

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PortaAPL
Portable Software
60 Aberdeen Ave
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(617) 547-2918
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IBM Personal Computer APL
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Requires: 128K memory, one disk drive, math co-processor, DOS 2.0 or later.

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History

APL had an inauspicious start as a mathematical-notation system (not a programming language) for expressing the sorting of algorithms. It was developed by Ken Iverson while he was teaching at Harvard in the late 1950s.

Iverson joined IBM in 1960, and APL underwent a relatively long gestation period before it was set in semipermanent form in 1966 in an internal IBM experimental time-sharing system. During that period, Iverson and others (most notably his longtime colleague Adin Falkoff), not shackled by the constraints of an implementation, could perform both major and minor surgery on the notation. The long delay was crucial to APL's strong sense of consistency. APL's economy of expression and its minimalist's approach to rules are more striking than any other language's.

IBM finally sent APL out into the world (reluctantly, it appears, and without any support) in 1969, after eager customers who got a glimpse of it during its research-project phase demanded it. During the next decade, numerous implementations sprang up on nearly every major vendor's hardware. Its user base broadened considerably, too. Large corporations, especially, latched on to it as just the ticket for complex, frequently changing, or short-lived applications. The later kind of applications spawned the idea of throwaway code. As you might expect from its beginnings, APL has a large following in IBM. As far back as 10 years ago, current IBM head John Akers estimated the company's APL user community at 16,000.

During the 1980s, APL has followed the crowd by making the transition from mainframe to micro; successful implementations are available on nearly every commercial system. The initial implementations were limited in size and scope. Machines whose total memory was 64K bytes of RAM had to fit in both the interpreter and workspace, to the detriment of both: Many designers omitted infrequently used functions and operators to increase available workspace.

Nonetheless, APL had gained a foothold in the micro world. As micros grew both in power and address space, full APL systems began to appear. Now they match or exceed many mainframe systems in functionality (particularly graphics) if not in computing power. The four APL systems reviewed below all meet these specs.

WATCOM APL

WATCOM APL is one in a series of APLs produced by Watcom Products, including versions for IBM and DEC mainframes. It is nicely packaged, with an APL user guide, a reference manual, and a *Read Me First!* pamphlet that catches the eye right away. This pamphlet carefully describes operations like installing the character ROM in a monochrome or color/graphics board so the system can display APL characters in eye-pleasing text-mode resolution.

EDITOR'S CHOICE

*With APL*PLUS PC, STSC has committed to putting out a high-quality system, and the fact that it's up to Version 4.6 and working on 5 demonstrates that it's really in the business. The company listens to its customers: It recently sent out a survey asking customers what they'd like to see in the next version. STSC corrects problems when it finds them and keeps up with the industry by adding features as they become important, such as support for the new EGA.*

*STSC is keen on letting people learn APL from scratch. The company spared nothing in terms of documentation. But APL*PLUS PC is equally appealing to experienced programmers because of STSC's commitment and the product's sophistication.*

You'll have to install the character ROM if you want to be able to read the APL characters on the screen, but it also means you'll have to give up some of the infrequently used characters in the standard IBM character set. Even on a graphics card, there's no option to represent the characters with bit-mapped graphics. The WATCOM package comes with a set of keyboard stickers to enable you to find APL characters easily. The reference card is both complete and nicely laid out.

You start up the system with a batch file that can include such features as the file

system, formatting, and the graphics primitives. I'm sure the implementers had good intentions when they decided to design it that way, but this batch-file method is all too reminiscent of APL's 64K past, when designers dealt with limited workspace by throwing features overboard. I prefer an APL system to be monolithic, with all primitive and system functions available at all times.

The graphics-system functions are fast and easy to use. An attractive demonstration illustrates how to use the functions in open code and makes an excellent teaching vehicle.

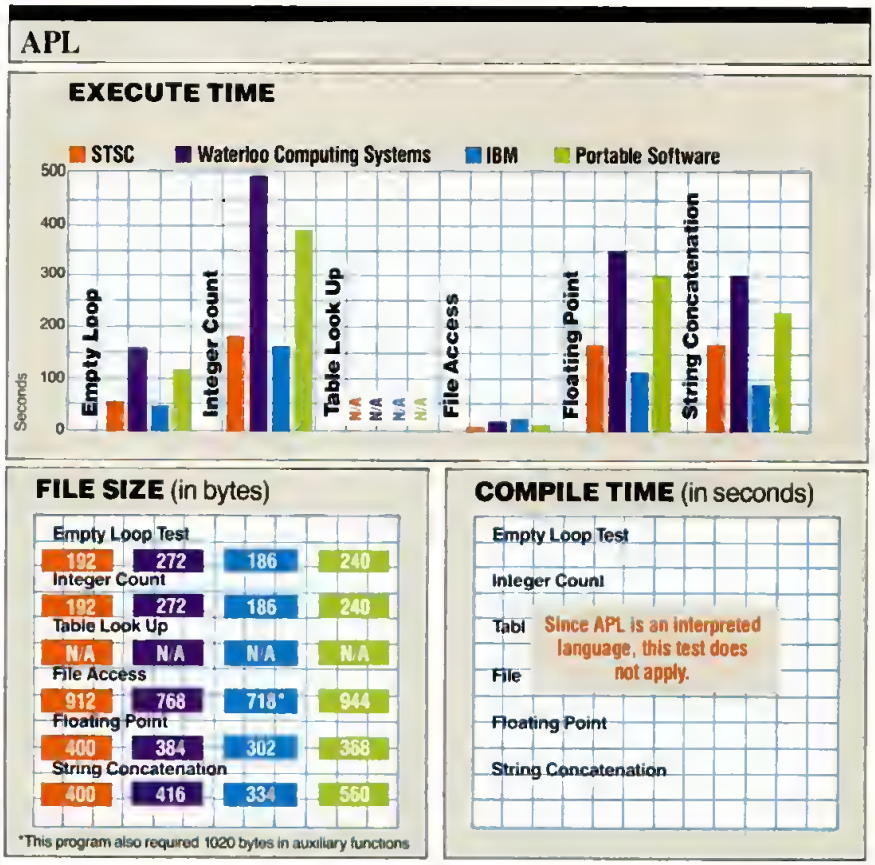
You have access to both an APL component file system and the familar DOS file system; it's pleasant to find systems commands to transfer functions and data into and out of the workspace in the standard APL form.

The system also shows its modem trappings with a built-in communications facility, "trace" and "stop" as system functions, and event-handling facilities similar to IBM's mainframe APL2. Several system functions deal with direct access to the machine memory space and execute machine language code. If an 8087 or 80287 math-coprocessor chip is present, the software makes use of it; otherwise, the software performs floating-point computations itself.

WATCOM APL makes the usual APL line-oriented function editor more palatable by including an on-screen editor in which the cursor can roam around and make changes to lines at random. (The implementation has no built-in full-screen function editor.) This feature is particularly helpful in immediate-execution mode.

The only system function I feel is lacking is Quad-AI, a standard APL function that returns, among other things, cumulative CPU time, which is handy when you are running benchmarks. Instead, WATCOM APL uses Quad-TS, the time-stamp function, for this purpose.

On *PC Magazine*'s benchmarks, WATCOM did not distinguish itself, coming in dead last in all but one category. On the other hand, the system has a very nice feel and some good capabilities, so don't rule it out based on the benchmark results alone.



The STSC APL*PLUS PC, WATCOM APL, IBM APL, and PortaAPL benchmark results.

PortaAPL

Portable Software has lived up to its name by offering compatible APL systems for the IBM PC, Apple Macintosh, and DEC VAX. The IBM PC version is reasonably complete. Its documentation is packaged in an 8½-by 11-inch three-ring binder that is somewhat unwieldy to use. The first part consists of a brief user guide followed by a clearly stated, one-page-per-topic reference manual with examples. A reference card also is included, and a separate installation manual is appropriately thin. The *IBM APL Language Reference Manual* for IBM mainframes is included, a choice I found somewhat odd at first. Upon further reflection, that may have been a wise choice as the IBM reference manual is a reasonably good introduction to the APL language.

PortaAPL handles the character set issue by graphing the characters when a graphics card is present or mapping as best it can into the monochrome character set. It also supports the character ROM supplied with the STSC APL*PLUS PC system in case you happen to have both, I guess (see review). An ASCII mode option uses the standard IBM character set and represents APL primitives as key words such as *max*, *ceiling*, and *grade_down* or as symbols. In this mode, lowercase letters are used for the key words, uppercase letters are for user functions and variables. It's quite usable.

This version of APL has a nice full-screen function editor, which you invoke through the "del" symbol usually used for the line-oriented editor. Although I was momentarily surprised, I had no trouble using the full-screen function editor without consulting the documentation. In fact, PortaAPL doesn't actually have a traditional line-oriented editor. The only draw-

AT Powe

High performance, high capacity hard disk subsystems

A Single DOS Volume up to 240 formatted MBytes in size on your PC is only the beginning of Emerald subsystems' features. However, it is a very important one to many of our customers.

Most serious micro computer users are familiar with the infamous *32 MByte DOS Barrier*. Some of you have only read about it; others have run up against it bead on when trying to run PC Focus or a downloaded mainframe program.

If you are one of those who have hit it head on you'll be pleased to know that *for almost a year Emerald has been shipping fixed disk subsystems that solve your problem.* Subsystems. Plural.

All Emerald subsystems can be operated as a single volume up to their formatted capacity. That includes our 36, 50, 70 and 140 MByte subsystems, in addition to the 280.

```
C) chkdsk

237633536 bytes total disk space
    65536 bytes in 2 hidden files
    49152 bytes in 2 user files
237518848 bytes available on disk

    262144 bytes total memory
    205152 bytes free
```

Actual printout of CHKDSK on 240 MByte volume.

You Determine how many volumes exist in your PC, and what size they are. You can have as many as *24 volumes*, and make each one exactly the size it needs to be.

Set-up is menu driven and as simple as *"How many do you want"* and *"How big should this one be?"*

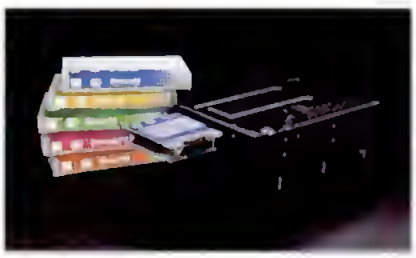
Integrate your existing hard drive into your new sybsystem. Emerald's Disk-Meld technology makes it possible for your XT's 10 Mbyte, or AT's 20 Mbyte drive to become part of a single large volume. For example, if you have an AT with a 20 MByte drive and an Emerald subsystem with a 70, you can use *all* your storage as a single 90 MByte volume. Disk melding makes it easy to combine Emerald drives with each other or with your existing drive to get a subsystem with the storage capacity you need.

Operating System and Network flexibility is yours for the asking. DOS 2.X, and 3.X will get you started. But, your Emerald subsystem can also support multi-user operating systems such as XENIX, VENIX, QNX and PC/IX and networks such as Novell, Sytek, Ungermann-Bass, 3 COM, X-Net, 10 Net, DNA Systems...

Additional Features include password security, 30 millisecond average access time, *automatic retreat to a safe landing zone* in the event of power failure or shutdown, and a long list of PC and AT compatible micro computers.

High performance 1/4" tape backup

60 MBytes in 12 minutes is *FAST* backup, but there's more. If your files are larger than 60 MBytes, Emerald's Backup and Restore Utility (BRU) software will automatically break your file into 60 MByte sections and prompt you for a new cartridge. Of course, restoring is just as easy.



Compact tape drive fits in the AT's front panel expansion space. 60 MByte cartridges are certified for high performance and supplied with color coded labels.



Emerald subsystems were designed for the PC, AT and compatibles such as the AT&T 6300 and Compaq DeskPro.

Menu driven software makes it simple, even for novices, to backup or restore exactly what is needed, and no more. Choose one or more files that were modified after a *Specified Date and Time*, one or more *Specific Files or Directories*, or *All Files and Directories on a DOS Logical Volume.*

Restore data on a different micro if you like. Backup up your company's Emerald subsystem in Portland, Maine and ship the tape to your office in Los Angeles. Because of the defect mapping technique used on Emerald hard disks, the subsystem in L.A. will import your data error free.



Special defect mapping technique allows data to be restored on subsystems other than the original source.

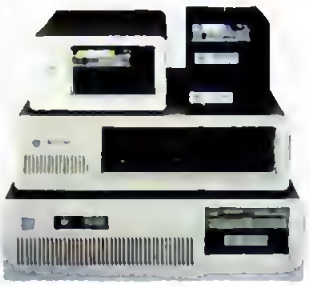
The BRU software *automatically checks, and adjusts to, the defect map* of every Emerald subsystem before restoring data to it.

IBM PC, XT, AT, & PC/IX™ International Business Machines Corp.—AT&T™ American Telephone and Telegraph Corp.—Compaq & DeskPro™ Compaq Computer Corp.—Ungermann-Bass™ Ungermann-Bass, Inc —Emerald, DiskMeld, BRU & Mainframe Storage for Micros™ Emerald Systems Corp.—UPS™ United Parcel Service.—3 COM™ 3 COM Corp.—ONA Systems™ Network Development Corp.—PC Focus™ Information

: is Yours.

Configured for today's Micros

The Physical Design of the Emerald subsystems lets you determine the configuration that will best serve your needs. Many of today's high performance micros have sacrificed expansion space in favor of compact size; others offer plenty of room for additional drives, tape units and expansion cards. Emerald subsystems provide you with the expansion ability you need. And, they're designed to allow you to continue to expand as your needs continue to grow. No matter which PC you have, there is an Emerald subsystem that will meet your needs.



Subsystems are available for the PC, AT and true compatibles in a variety of configurations.

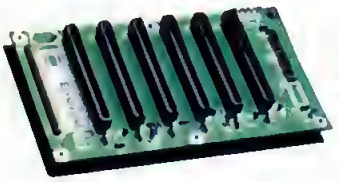
Internal Expansion is easy on the IBM AT and XT. Emerald subsystems are pre-initialized and pre-formatted—just slide the tape or hard drive you have selected into one of the existing expansion areas, plug in a couple of cables, tighten a few screws and replace the system cover. Elapsed time: 10/15 minutes.

The AT accepts 280 MBytes *or* any single drive up to 140 MBytes *and* a 1/4" tape drive. The XT accepts any Emerald hard drive up to 140 MBytes in size, *or* the 1/4" tape drive.

External and Portable expansion is easy and practical with the Emerald Portable Subsystems. These IBM color-matched subsystems have their own power supply and are available with hard drives up to 140 MBytes in capacity *or* with a 1/4" tape drive.

Ordering a tape host adapter card for each of your PCs and physically moving the 1/4" portable tape sybsystem to where it is needed will save you *thousands of dollars* over the cost of individual portables for each micro.

The portable hard drive configuration is ideal for security sensitive environments. The hard disk is password protected and the entire subsystem is small enough to be locked in a standard safe or filing cabinet.



"Expansion chassis" subsystem also provides 6 additional spaces to add cards to your PC.

The 6 Expansion Slots in the Emerald expansion subsystems will be a welcome addition to many micros. If you don't have enough expansion room in your micro, or, if you've used every available slot, then one of these subsystems is just right for you. They are closely matched to the IBM PC in size and color, and have their own, built-in, power supply.

Expansion subsystems are available with drive sizes to 280 MBytes in capacity, with, or without, a built-in 1/4" tape drive. When coupled with an AT a truly powerful computer system results.

The *real* backup procedure

Standing Behind You all the way is the company that broke the 32 MByte DOS harrier.



Documentation, host adapter card, software and cables are included with each subsystem.

First, we provide everything needed to get you up-and-running quickly. Then, we back you up with specialists, available 16 hours a day, to help with network implementation, applications support, XENIX and technical questions, and to provide *48 hour in-and-out repair service.*

Delivery and Warranty are important considerations. Your Emerald subsystem will be shipped within 14 days of order, via UPS, and comes with a 30 day money back guarantee and a 120 day warranty. Warranty extensions are available for 1 and 2 year periods.



Fast service and fast shipping are company policies.

Users with large database applications in factory automation, CAD/CAM, accounting, medical, R&D, Point-of-Sale and many other areas are already telling their friends about Emerald. A large percentage of them are in Fortune 500 companies, and many others are on their way to Fortune status.

If your company fits one of those categories, or, if you're a smaller company with an application you thought could only be done on a mainframe or mini, pick up the phone. Call Emerald. An Applications Engineer is standing by to answer your questions, send you literature and refer you to an installed site in your area.

Let one of our customers tell you, first hand, how Emerald helped give *his* AT Power.

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XENIX™ Microsoft Corp.—VENIX™ Ventur Com—QNX™ Quantum Software—Novell™ Novell, Inc.—X-Net™ XCOMP, Inc.—10 Net™ Fox Research, Inc Builders.

back to this scheme is that the full-screen function editor makes it more difficult to incorporate test lines into programs when used in conjunction with an on-screen program editor. Unfortunately, the PortaAPL version doesn't have such an on-screen editor at all. It doesn't take but a minute of use to regret the omission. The only way to repeat what you just typed in, with a minor variation, is to retype the entire statement.

PortaAPL lets you access DOS files, but it has no component file system for APL variables. This serious omission makes it much harder to design APL-based applications that need permanent storage for APL data.

PortaAPL does have system commands for importing and exporting data in the usual standard APL workspace transfer form. The software makes use of a floating-point chip automatically if you have one and emulates it if you don't. You can execute machine language code in the

APL at Work

APL's ability to get the job done with a minimum of suffering makes it attractive to many companies for many applications.

From running a major manufacturing plant to tracking bills in Congress, the applications of APL are diverse, but they share common threads.

In mid-1984, the Bristol-Myers Company brought a unique and major facility on-line in Holland to manufacture a line of nutritional products for export to various world markets. At the facility's heart are 12 PCs linked by a local area network. These machines control orders and inventory, plan materials requirements, track purchasing and receiving, master scheduling of the plant operations, assist in quality control, and handle the general accounting including general ledger, payables and receivables, and cost accounting. What's so unique about these operations is that all these functions took the form of custom software written in APL in only a year and a half. Although you would expect various pieces of commercial software to be able to fill the company's needs in each of the categories, in many cases, the size of the operation was larger than commercial pack-



What do you get when you cross a Database Manager with Artificial Intelligence and a Word Processor?

ages on PCs could handle. APL gave Bristol-Myers the edge it needed.

Insurance companies are no strangers to APL. Their actuarial departments uniformly embraced the language long ago as an ideal notation for expressing complicated mathematical ideas. Not surprisingly, APL's use and influence has spilled over into many other insurance-related areas.

When Phoenix Mutual Life Insurance Company needed to let its field offices prepare insurance proposals locally, the firm turned to APL on the PC. An insurance proposal can be viewed in many ways depending on how dividends, borrowing options, and payment of premiums are structured, which makes for a complicated program. By placing PCs in each field office, the company can have agents enter the customer's information and generate up to a 30-page report. Bob Finnegan, the project's leader, says the company chose APL because of its speed of development and the flexibility it provides for making changes as a customer's individual requirements become more and more sophisticated. In this particular case, the actuarial department wrote a small section of the code; the rest was done by four analysts in the DP department—their very first excursion into APL.

Mainframe Connections

Because APL began on mainframe computers, the language is often used on microcomputers in conjunction with their larger siblings. American Airlines, which uses mainframe APL heavily for financial planning and forecasts, has

(continued)

workspace; one supplied with the system implements functions such as graphics output, sound generation, and PEEK and POKE statements. As an aid in writing your own code, the assembly language code that generated those functions is included.

The inclusion of several newsletters with PortaAPL shows that this is a growing system created by people who like to keep in touch with their customers. Overall, PortaAPL is a reasonable system despite several important omissions and an unimpressive rating on PC Magazine Labs benchmark tests.

IBM Personal Computer APL

IBM Personal Computer APL's system documentation comes in the familiar 8- by 9-inch three-ring binder and slipcase. It's split into two parts: The first introduces you to the system, discussing backup, start-up, the character set, the keyboard, and the

Introducing Q&A™ software by Symantec. The first and only practical application of advanced artificial intelligence techniques.

All data management software has the ability to organize, store and manipulate data.

But only Q&A has the intelligence to do it with questions and instructions in real English.

Like: **"What are the monthly rents of all houses with pools?"**

AN INTELLIGENT DATABASE MANAGER.

Q&A is built around an intelligent assistant that understands questions and instructions put to it in your own words. Data can be changed or added simply by telling the assistant to do so.

Like this: **"Change the rent of Jake Smith's house to $1300.00."**

The intelligent assistant also learns from your experience. So it's easy for you to tailor it to your personal vocabulary and style of working. You can even give it a name it will remember and respond to.

Q&A has plenty of headroom. It handles fast, flexible indexing, macros, and can be customized using simple programming.

And import/export capabilities for pfs:File,* pfs:Write,* 1-2-3, WordStar, MultiMate, and dBase II/III come standard.

AND A LIGHTNING-FAST WORD PROCESSOR.

You need more than just database capabilities, so we built an extremely quick and powerful word processing package into Q&A.

It's RAM-based for speed, handles up to 80 pages, and allows larger documents to be linked for printing.

Integrated with Q&A's intelligent database, it offers outstanding mail merge features. And it supports all the most popular printers. Even laser printers.

Q&A opens the door to a whole new way of managing data. A process we call What-Is analysis.

What is What-Is?

The answer to that question is on the next page. But if you're already sold on Q&A, call 1-800-556-1234 x576 (1-800-441-2345 x576 in CA) for complete information on how to get it.



CIRCLE 249 ON READER SERVICE CARD

(APL at Work continued)

only recently begun to use APL on PCs. Using the communications features of STSC's APL implementation through IRMA boards, users download data and analyze it locally in APL, developing their own reports. Alex Nesenjuk, American Airline's manager of system planning and administration, likes the way the APL language makes it possible to start from scratch and easily produce finished applications in a short time.

APL's uncanny ability to model data has been recognized by financial planners for many years, long before *1-2-3* arrived on the scene. At Morgan Stanley & Company, APL is used on the IBM PC by business analysts who write their own specialized programs. Programs developed on the PC can then be uploaded to the mainframe for others to use. In general, APL on the PC is a powerful and inexpensive learning environment, much less expensive than experimenting on a mainframe on which time is charged back to users.

When lobbyists, special-interest groups, large corporations, law firms, foreign embassies, and state and local governments need to know what's going on in Congress, they turn to the Legi-Slate an on-line service in Washington. Legi-Slate turns to APL, which it uses to maintain an on-line database of the actions of each Congress. It tracks each bill throughout the legislative process from its introduction through scheduled hearings to final disposition. Each member's vote on each committee is recorded and available for analysis, along with a great deal of additional data. PCs are used for input, validation, proofing, and editing of the data before it's shipped to the mainframe.

Jeremy Main, vice president for technical development, says Legi-Slate chose APL because of its interactive environment and ability to respond rapidly to change. He notes, "When you're subject to the whims of Congress and a customer's off-the-wall requests, flexibility is paramount." He also uses APL on PCs to collect data from diverse sources for inclusion in the company's mainframe database. One source is *The Washington Post*, its parent company, which makes available an electronic version of a portion of the daily paper. Legi-Slate leaves a PC with APL running to catch the 2 a.m. edition as it flies by, reformatting the individual stories, removing the typesetting codes, and, finally, shipping it to the mainframe.—**Bob Smith**



What is What-Is?

input editor; describing several application workspaces supplied with the system; and ending with a discussion of auxiliary processors (APs, such as AP210 for accessing DOS files), which enable the system to deal with the outside world. The second part of the documentation tersely covers the APL language, system commands, and function-definition mode.

Each time you start up the system, you must decide what you're going to need during that session. Think you might use files? You'd better know beforehand because if you don't load the AP210 module on the APL command line, it won't be available. Is there a dyadic format in your future? Not if you don't remember to load EXAPL at start-up. You can't write a batch file that automatically loads all the APs and EXAPL at once because you would exceed (by one) the limit that IBM has set as to how many such items can be loaded at start-up time.

Starting the IBM system may require a patch or two anyway. If you start it with more than 512K bytes free, it crashes. If you have much in the way of resident software (and who doesn't, these days), it may also crash, because the initial program stack is too small (less than 50 bytes for DOS function calls). If you invoke the system from a drive or directory other than the one in which it resides, it crashes. Rather a fragile program, I'd say.

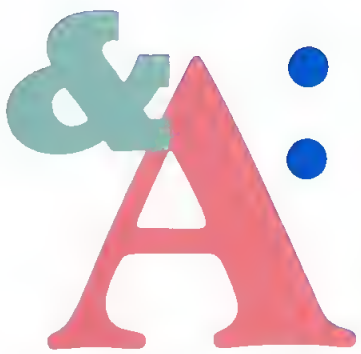
The system requires a floating-point chip. It doesn't even benignly test for the chip—it waits for you to install one. Similarly, it requires a graphics card for a bit-mapped representation of the character set, although at least it won't crash on a non-graphic monochrome screen. However, it

```
[1]   T←⎕AI[2]
[2]   X←0
[3]  L1:→(10000>X←X+1)/L1
[4]   'TIME = ',▼⎕AI[2]-T
      ∇
```

STSC APL*PLUS PC: Empty loop test.

```
[1]   T←⎕AI[2]
[2]   X←0
[3]  L1:→(32767>X←X+1)/L1
[4]   'TIME = ',▼⎕AI[2]-T
      ∇
```

STSC APL*PLUS PC: Integer count



What-If analysis—using an electronic spreadsheet to get quick answers to hypothetical questions about financial issues—has revolutionized financial forecasting.

What-Is analysis—using artificial intelligence techniques to get quick answers to questions about What-Is in a database—is revolutionizing the way people access data.

And it's only available in Q&A™ software by Symantec.

IT'S A WAY TO ASK YOUR DATABASE QUESTIONS. IN YOUR OWN WORDS.

With Q&A, finding out What-Is in a database is as simple as asking a simple question.

Like: **"Which condos rent for less than $1000.00?"**

Using information in the database, Q&A's intelligent assistant will make the necessary calculations and respond with a list of condos that satisfy the criteria. Instantly.

And if that answer suggests another question, all you have to do is ask.

"Which of them have microwaves?"

That's practical intelligence.

IT'S AN INTELLIGENT ASSISTANT WHO HELPS GET THINGS DONE.

Q&A's intelligent assistant can get all kinds of things done. Fast.

It can find and organize information. Even make changes in the database.

For example, tell the assistant to **"Increase all security deposits by 25%,"** and it will be done. Throughout the database.

There are no commands to memorize. And you can teach the assistant to respond to you individually.

Naturally.

Other databases boast about their power. But power without intelligence is power wasted.

Q: What do you call software that gets smarter as you use it?

A: Q&A.

For more answers about Q&A, turn the page. Or call 1-800-556-1234 x576 (1-800-441-2345 x576 in CA) for complete information on what else What-Is is.



CIRCLE 250 ON READER SERVICE CARD

makes no attempt to cater to monochrome screens with a character generator or a keywords scheme.

A full-screen function editor is available using the "edit" workspace and AP205 (the auxiliary processor for the full-screen editor). When you're in immediate-execution mode, you can move the cursor about on the screen. Typically, to make a change you would move up to a previous line, type over the characters there, and press Enter. That action copies the changed line to below the last executed line and executes it.

You use the Escape key to signal interrupts. If in your haste you forget and use the old familiar Ctrl-Break, you'll find yourself staring at a DOS prompt and wondering when you last saved your work. One of the distributed workspaces lets you access DOS files in conjunction with AP210. IBM gives you no component file system for APL variables, making it hard

```
[1]   T←⎕AI[2]
[2]   X←0
[3]  L1:→(10000<X←X+1)/L2
[4]   B←1234.56
[5]   C←78.9
[6]   A←B×C
[7]   A←B÷C
[8]   →L1
[9]  L2:'TIME = ',▼⎕AI[2]-T
     ▽
```

STSC APL*PLUS PC: Floating-point test.

```
[1]   T←⎕AI[2]
[2]   X←0
[3]  L1:→(10000<X←X+1)/L2
[4]   A←'THIS IS A STRING'
[5]   B←'THIS IS A LONGER STRING WITH LOTS OF WORDS IN IT.'
[6]   C←A,B
[7]   →L1
[8]  L2:'TIME = ',▼⎕AI[2]-T
     ▽
```

STSC APL*PLUS PC: String concatenation test.



What do you call software that gets smarter as you use it?

to manage APL data. But system commands do support the APL workspace transfer format.

IBM APL has no graphics capability (I would have expected an auxiliary processor to handle that). It has a decent amount of documentation on how to write an AP, but you need to be an accomplished assembly language programmer to make sense out of it.

On the PC Magazine Labs benchmark tests, IBM APL was fastest in all operations except reading and writing files. Based upon other benchmarks I've seen, I know it to be particularly fast on floating-point algorithms. I had to install another patch to fix a bug in the timer code; without it the timings are erratic. To the best of my knowledge, only the patch to the 512K-byte memory bug is officially sanctioned by IBM. After over 2 years out of the closet and on the market, APL's patches are still considered unofficial.

Overall, IBM APL is a disappointment. It hasn't changed in 2 years—the same bugs, flaws, warts, anomalies, and poor design that I found in it then still remain. It's certainly time for an update. From the company that nurtured APL for so long, I expected better.

On the PC Magazine Labs benchmark tests, IBM APL was fastest in all operations except reading and writing.

APL*PLUS PC

STSC's APL*PLUS PC is the implementation by which all the others should be judged. It is very professionally packaged and extraordinarily complete. Two large and excellent tutorials are included: the venerable *APL—An Interactive Approach*, by Gilman and Rose, and *APL Is Easy!* by Jerry Turner. The former text is well known throughout the industry. The latter takes the novice through the first 10 to 15 hours of learning APL. Either text could be recommended on its own. STSC certainly isn't leaving to chance your introduction to APL.

Along with these excellent tutorials are two thick 8- by 9-inch three-ring-bound manuals in slipcases that describe the APL*PLUS PC system and how to get the most out of it in great detail. Both keyboard stickers and an attractive placard are provided—your choice. There's even a change-of-address card included.

In keeping with the multiple-solution approach, STSC handles the character set by giving you several choices. A character-generator ROM is provided for the standard monochrome and graphics monitors. Even if you have an odd graphics



Q&A™ is built around an intelligent assistant that's smart enough to learn from your experience.

So you can teach it to respond to your needs to a degree no other software can match.

You'll find that that capability is worth a lot to you.

No matter what you use it for. Stock market analysis. Inventory. Employee data. Tickler files. Phone logs. Mailing lists. Anywhere you need fast access to stored data.

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At $299, we believe Q&A offers more value per dollar than any other software product on the market.

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We've come up with a way for you to get some value out of whatever database or word processing package you're currently using.

If you make the switch from another program to Q&A, we'll give you $50 off the purchase price. See your dealer for details.

And we'll give a 30-day money-back guarantee.

CALL IT THE BEST DEAL IN MEMORY.

We have an inexpensive way for you to take advantage of Q&A's intelligence and upgrade your hardware at the same time.

For a limited time, we're offering a half-length 256K memory board with Q&A. It's worth $200 on the street, comes with a 12 month warranty, and when you buy Q&A, it's yours for just $50.

If Q&A is beginning to sound like a good investment to you, a quick demo should convince you.

Go to your local Q&A dealer and ask for one.

For more information on Q&A and What-Is analysis, call 1-800-556-1234 x576 (1-800-441-2345 x 576 in CA).

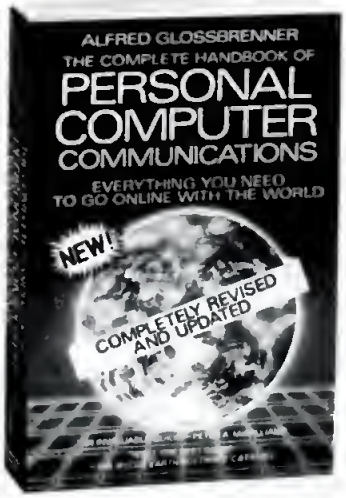
We think you'll be glad you did.

Call it a hunch.



CIRCLE 251 ON READER SERVICE CARD

HOOK UP TO "THE BEST GUIDE"*



The first edition of this classic guide put over 125,000 computerists "online with the world." Experts hailed it:

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- New sources of ***free*** software
- Updated buyer's guide to modems and software
- Leading-edge tricks for saving time and money and much, much more

Whether you own a modem, are planning to purchase one, or simply want to get more out of your computer, you can't find a more helpful, more complete, more up-to-the-minute guide than THE COMPLETE HANOBOOK OF PERSONAL COMPUTER COMMUNICATIONS. "Still the best" (*The Whole Earth Software Catalog*) and still only $14.95!

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Please send me _____ copy(ies) of THE COMPLETE HANDBOOK OF PERSONAL COMPUTER COMMUNICATIONS by Alfred Glossbrenner @ $14.95 each plus $1.50 for postage and handling. If it is not everything you say it is, I understand that I may return it within 10 days, in resaleable condition, for a full refund.

Name _____
Address _____
City _____
State _____ Zip _____
PC

CIRCLE 474 ON READER SERVICE CARD


```
[1]   T←⌊⎕AI[2]
[2]   'TEST.DAT' ⎕NCREATE ¯1
[3]   X←¯1
[4]   REC←132ρ⌊⎕AV[1]
[5]  L1:→(100≤X←X+1)/L2
[6]   REC ⎕NAPPEND ¯1
[7]   →L1
[8]  ⍝ READ RECORDS BACK
[9]  L2:X←¯1
[10] L3:→(100≤X←X+1)/L4
[11]  A←⎕NREAD ¯1 82 ,(ρREC),X×ρREC
[12]  →L3
[13] ⍝ MODIFY AND REWRITE RECORDS
[14] L4:X←¯1
[15]  REC←132↑'MODIFIED'
[16] L5:→(100≤X←X+1)/L6
[17]  A←⎕NREAD ¯1 82 ,(ρREC),X×ρREC
[18]  REC ⎕NREPLACE ¯1,X×ρREC
[19]  →L5
[20] L6:'TIME = ',▼⌊⎕AI[2]-T
```

STSC APL*PLUS PC: File access test.

board, STSC is likely to have a ROM for it. It's also possible to use bit-mapped characters on a graphics card without installing the ROM. In either case, it supports key words for the APL symbols. Finally, if you have an Enhanced Graphics Adapter, STSC provides a resident character generator that displays the APL characters in nearly the same resolution as they are displayed on a monochrome monitor, but in 16 beautiful colors.

> Altogether, APL*PLUS PC includes over 130 system functions and variables along with detailed documentation to support them all. It contains nearly everything you would want from APL.

A full complement of built-in graphics-system functions support a number of different monitors and graphics boards, including the Enhanced Graphics Adapter. Also included is a graphics demo workspace from which you can learn how to do it yourself.

A full-screen function editor is native to the APL*PLUS PC system, in addition to the usual line-oriented editor and a full-featured on-screen editor for immediate-execution mode. All of the editors are extremely easy to use and work just as you'd expect—no surprises here. Data that has scrolled off the top of the screen is easy to retrieve. A very complete on-line help facility is but a keystroke away. This version has an APL component file system, provides you with access to DOS files, and supplies the standard APL transfer format in a workspace on the distribution disk. It includes a built-in communications facility as well.

Altogether, APL*PLUS PC includes over 130 system functions and variables along with detailed documentation to support them all. In fact, this system contains nearly everything you would want from APL. STSC has done a thorough and impressive job.

Further Reading

If your appetite for APL has been whetted and you want more, contact SIGAPL, the United States APL user group. The current chairman is John Myrna, who can be reached at STSC Inc., 2115 E. Jefferson St., Rockville, MD 20852. A bulletin board devoted to APL can be reached at (301) 340-6296. ■

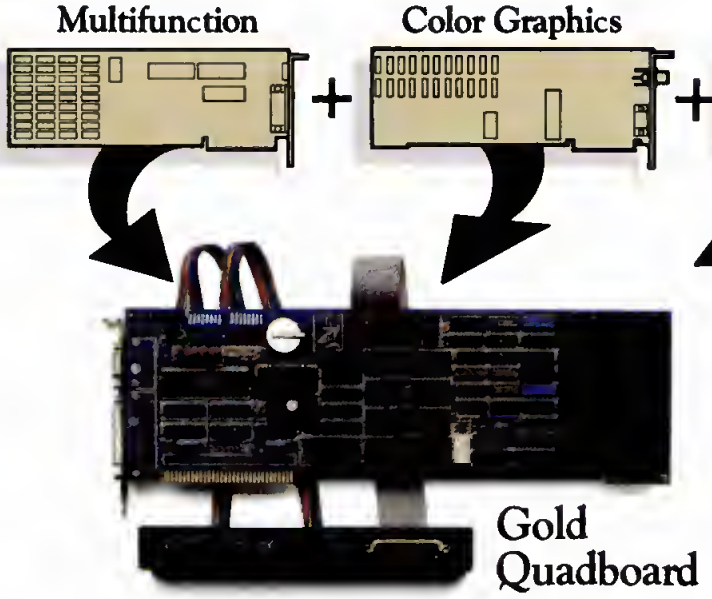
Bob Smith is president of Qualitas Inc., a PC software-development firm based in Bethesda, Maryland. He has 15 years' experience in many facets of APL use.

Introducing The Gold Quadboard®. *"The hardware equivalent of 1-2-3."*

Computer Buyer's Guide and Handbook, September, 1985

Quadram® introduces a new standard in PC enhancements: the Gold Quadboard, the board people are calling "the hardware equivalent of 1-2-3." Like 1-2-3®, the Gold Quadboard combines three powerful products into one to deliver the most value for your dollar and conserve slot space.

With the Gold Quadboard you get: 1) A multifunction board complete with RAM expansion and the ports you need to increase system power; 2) An IBM®-compatible color graphics adapter that supports brilliant color graphics displays; and 3) Keysaver, the unique battery-powered back-up system that lets you store over 4,000 keystrokes of input data on the Gold Quadboard.



Use Keysaver to protect your data from power outages or misstruck keys, or create keyboard macros to help automate your work. Keysaver even comes with a special security feature that protects your system from unauthorized access.

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The Gold Quadboard is 100% PC-compatible, built for reliability, and engineered for performance. No other multifunction board gives you more value for the money. To find out more, visit the Quadram dealer nearest you. Or contact us at One Quad Way, Norcross, Georgia 30093-1308; (404) 923-6666.

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An Intelligent Systems Company

CIRCLE 488 ON READER SERVICE CARD

WORDS INTO TYPE: MEETING THE CORPORATE CHALLENGE

Laser printers, typesetting front-ends, and page-composition software are taking corporate publishing by storm. A $10,000 investment can turn your company's printed pages into professional-quality documents.

Every company is in the publishing business. This is true whether it manufactures No. 12 pressure-release valves or sells that most celebrated product of the post-industrial age, services. It applies to the self-employed as much as to the professional group and the mega-multinational. Whatever you choose to call it, "in-house," "corporate," or "desktop," publishing—merging words with paper—is a big and inescapable part of doing business.

Most businesses generate mountains of printed matter: forms, internal newsletters, memos, reports, technical documents, training manuals, and slick (and not-so-slick) promotional material. According to Corporate Electronic Publishing Systems, a New York conference devoted to the subject, businesses spend as much as 10 percent of their yearly revenue on publishing-related expenditures. Many spend up to 50 percent more than necessary to get the job done.

The fastest-moving and most-bewildering developments in corporate publishing involve typesetting-equipment linkups to personal computers. They are bewildering because most men and women in business have very little idea of how words get into print. It's considered superfluous information, like knowing where the office manager orders bull clips or push pins. At larger companies, publishing mysteries are typically the province of a service department; at smaller sites, publishing services are often bought from a professional typesetting house. But the old ways are clearly changing.

New in-house publishing options are also bewildering because the technology is evolving so rapidly. The installed base of millions of personal computers in American businesses and the introduction of laser-printing technology have spurred specialized product developers into action. The technological advances driving these developments have their roots in Xerox PARC—the Palo Alto Research Center in California, where the first laser printers and page-composition terminals were developed just 6 years ago. The spinoffs from PARC's intensive research have already had extremely profound effects in some circles, but it was not until this year that relatively low-cost laser printers and page-composition systems have become widely available for the PC market. The result: The two worlds of professional publishing and in-house documentation are suddenly meeting in the equipment marketplace.

To grasp how far apart these two worlds have traditionally been, compare any page of *PC Magazine* to any business document produced by your word processor. More likely than not, the business document is printed entirely in one typeface and boldface or underscoring indicate emphasized words. The body of the text is probably about 6½ inches wide on every page. Multicolumn tables may appear along with the text to summarize numerical data, but if



Photograph: Dennis Kitchen

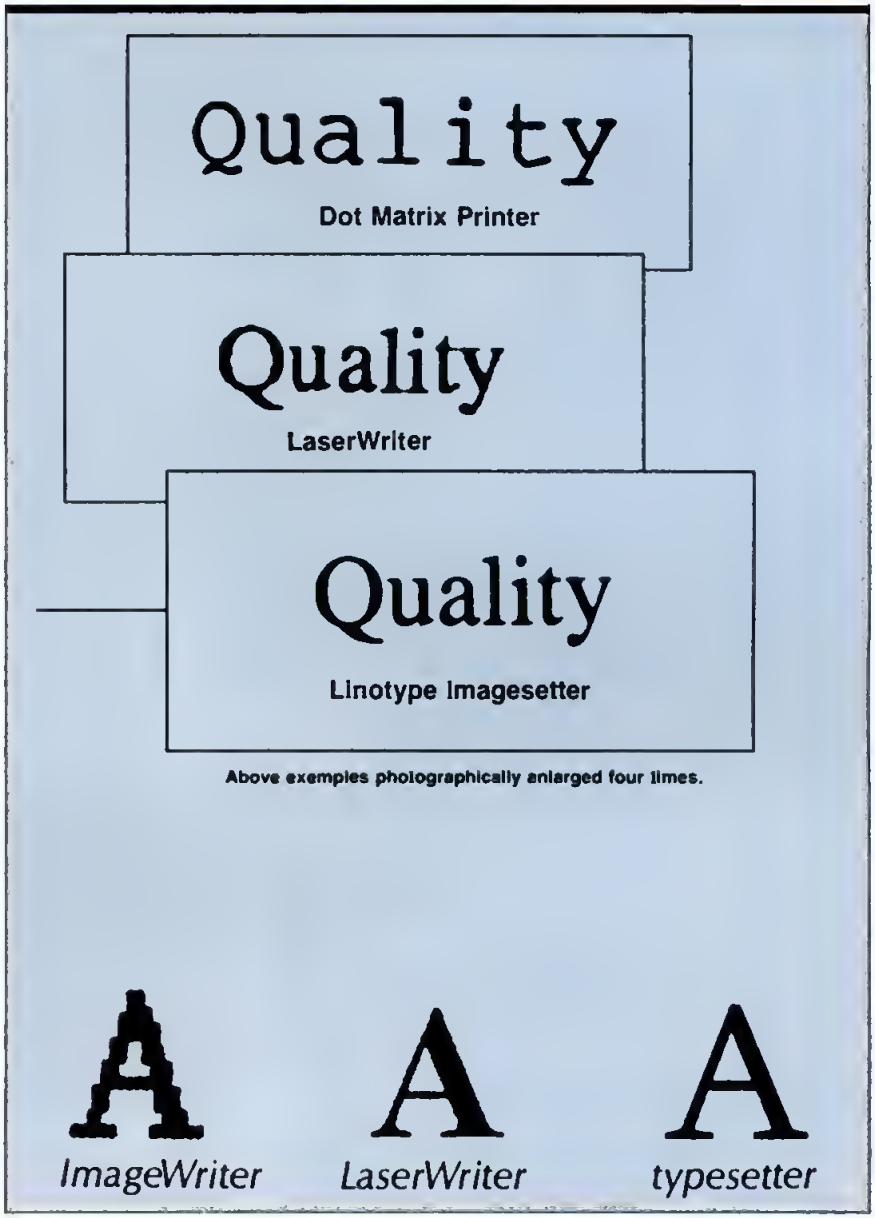
graphics are included, they were probably printed on a different printer from the one that printed the text. You may have noticed how hard it is to use visual clues, such as different type sizes, to find the important points in the text without reading the whole report word for word.

In contrast, a great deal of attention has been given to making the information presented on the pages of *PC Magazine* as clear and accessible as possible. The articles have narrow columns of text because they're much easier to read or skim than wide columns. Variations in type styles and sizes are easier on the eye and help you to zero in on the topics that may interest you most. Captioned illustrations throughout help you quickly see the whole picture, and large callouts highlight important points and sentences.

New in-house publishing options are evolving rapidly. The first laser printers were developed just 6 years ago, and this year low-cost lasers have become widely available for the PC market.

The most significant difference between common business reports and magazines is simply a case of "you get what you pay for." Any office can invest under $5,000 to buy a PC, a word processing package, and a printer to produce the type of nondescript business report described here. Once the text is scribbled on paper by the author, the amount of time it takes to produce it can be measured in words-per-minute typing speed. But achieving the professionally published look is another matter entirely. The text of this article, for instance, was produced on high-end typesetting equipment in a huge warehouselike building at a remote site. In addition to keying in the words, the typesetter had to insert many complex codes for selecting type fonts and column widths. Meanwhile, the art department put illustrations together using an assortment of tools, including computer graphics, slides, ink pens, and exacto knives. The typeset galleys were then manually cut up and glued in columns on boards, leaving spaces, called FPOs (for position only), for the artwork to be "stripped" in at the typesetting shop.

Today, it's possible to achieve magazine-quality pages using PC-based systems that cost under $10,000 and eliminate much of the costly manual layout and paste-up process. Current advances in corporate publishing may or may not add up to a publishing revolution as some partisans claim, but because they involve both PCs and American business, *PC Magazine* decided to take a closer look at the corporate publishing scene in this special report. Our editors will run several of the most interesting PC-based page-composition systems through the PC Magazine Labs benchmark tests and present the results in a future issue. ■



These print samples show the comparative quality of output from an ImageWriter printer, a LaserWriter printer, and a traditional typesetter.

NEW FROM BORLAND

Borland Introduces Reflex, The Greatest Analytical Tool Since The Couch

INTRODUCING REFLEX, THE ANALYST.

If you use Lotus 1-2-3™, dBASE® or PFS File™, you need Reflex™—because it's a totally new way to look at your data. It shows you patterns, relationships and interrelationships you didn't know were there, because they were hidden in data and numbers.

Reflex is the first database that separates the trees from the forest. The first database that understands that what you see depends on how you look at it.

The first database that probes relationships—then shows them to you in various graphic forms—scatter, line, bar, stacked bar and pie charts.

The first database to break the bonds of traditional DBMS (Data Base Management Systems) and give a dramatic visual turn to data analysis.

Reflex makes graphic leaps far beyond 1-2-3. With Reflex, when you look, you see.

HOW THE CRITICS REACT TO REFLEX

"The next generation of software has officially arrived."
Peter Norton, PC Week

"Reflex is one of the most powerful database programs on the market, its multiple views, interactive windows and graphics, great report writer, pull-down menus and cross tabulation make this one of the best programs we have seen in a long time. The program is easy to use and not intimidating to the novice. Reflex not only handles the usual database functions such as sorting and searching, but also "what-if" and statistical analysis. It can create interactive graphics with the graphics module. The separate report module is one of the best we've ever seen."
Marc Stern, InfoWorld

"What you see, then, is an interesting hybrid of a database and a spreadsheet that is ideal for analyzing tabular data."
Adam B. Green, InfoWorld

"More flexible than spreadsheets, this easy-to-use database analysis package presents information with visual clarity. Reflex is for you. The flexibility of switching between different views of the data lets you see relationships you may have previously overlooked. Without "what-if" analysis, key variables—such as cost of goods sold or travel expenses—may be out of hand but unnoticed. The type of analysis to uncover such a foible is awkward to do on a spreadsheet, yet, it may mean the difference between success and failure in a competitive situation."
Ira H. Krakow, Business Computer Systems

REFLEX OPENS MULTIPLE WINDOWS WITH NEW VIEWS AND GRAPHIC INSIGHTS.

You use Reflex's Form View to build your database; the List View lets you put data in tabular List form; the Graph View gives you instant interactive graphic representations; the CrossTab View gives you amazing "cross-referenced" pictures of the links and relationships hidden in your data. Report View allows you to import and export data to and from Reflex, 1-2-3, dBASE, PFS File and other applications and prints out information in the formats you want. In fact, Report View is probably the best 1-2-3 report generator you can buy today. It's also the cheapest—and you're getting all the other features free.

The commands for all five Views are consistent—so you're not stuck learning five different ways to get something done. And because Reflex uses advanced windowing techniques, you can see several views on the screen at the same time—without having to switch back and forth. You get the picture—and the pictures—all at once—if that's the way you want to look at things.

Modify a number and all your Views—List, Form and Graph—are immediately updated, on-screen. Changing a number changes the picture—which is mighty handy when you're analyzing (let's say) sales figures by salesperson; or you're in "What-If?" country asking yourself "What if we could add 2.5% in January sales?" "Show me."

"Give me the picture." "Show me what happens when we shift 11% of Nebraska's inventory to the new store in Hawaii." "Show me how many Gizmo 28's we have in every store in every state as of midnight last night and what happens to our East Coast stocks if the shipping strike lasts more than a week." "Show me."

So Reflex shows you. Instant answers. Instant pictures. Instant analysis. Instant understanding.

HOW IN THE WORLD CAN BORLAND SELL A PHENOMENAL PRODUCT LIKE REFLEX FOR ONLY $99.95?

At $495.00, Analytica's original price, Reflex was a bargain. Acclaimed by critics and praised by users, Reflex also got our attention at Borland International. We were so impressed by Reflex that we bought the company!

To celebrate that, we're making business software history by offering Reflex—FOR A LIMITED TIME—for ONLY $99.95! (Offer good through March 31, 1986).

That's $395.05 off the original price—which is a pretty good return on your toll-free phone call.

We think Reflex should be an "automatic product," a "standard" that every PC owner should own. That's why we priced it at $99.95. Naturally we've added our 60-day money-back guarantee and Borland's Reflex is not copy-protected.



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CIRCLE 147 ON READER SERVICE CARD

LASER PRINTERS AT THE CUTTING EDGE

Getting typeset-quality output from a desktop printer has long been a publisher's dream. Here are two printers that are making that dream come true.

The "face" of corporate publishing is rapidly changing, and laser printers, especially those developed for the PC, deserve a lion's share of the credit. Typeset-quality printing from machines that cost under $5,000 is the single most important reason for the new desktop-publishing revolution.

Laser printers range in price from $2,500 to $25,000. Printers at the new low end of the scale—under $3,500—are profoundly changing the workplace by offering a quiet and relatively fast alternative to daisy wheel and dot matrix impact printers while high-end laser printers are competing head-to-head with professional typesetting machines. Corporate electronic-publishing departments can currently get high-quality graphic output as well as typeset-quality text at a tenth of the cost of traditional typesetting equipment—a development that will have far-reaching effects on the appearance of PC-printed pages over the next few years.

New Technology

For years, the high price of laser printers wed them to mainframes. Canon initiated a major change in pricing for laser printers in 1983 when it introduced its low-cost LBP-CX laser engine. Designed as the basis for Canon's own desktop copier line, this compact machine incorporates convenience and clean imaging at a relatively low price. It didn't take long for printer manufacturers to realize that this same technology could be used in the production of low-cost laser printers and with this realization came the explosive growth of the laser printer market. Over the past 2 years, more than a dozen manufacturers have released laser printer models, or full product lines, all based on laser engines made by Canon, Ricoh, Toshiba, and Fuji Xerox.

Apple's LaserWriter and Hewlett-Packard's Laserjet are two low-end laser printers that have already had a noticeable effect on corporate publishing. Both of these printers use the Canon LBP-CX engine, but the difference between the value-added enhancements made by HP and Apple make the LaserWriter's list price twice that of the Laserjet.

Common Features

Both the Laserjet and LaserWriter look like Canon's desktop photocopier. They both perform their typographic and graphic feats using the same technology as laser-based photocopying machines: The laser light changes the electric charge on the areas it strikes on a drum. As the drum rotates, it picks up the powdery toner in the pattern of the electric charges. A sheet of paper picks up the toner as it passes below the drum. Finally the laser printer heat seals the image. This nonimpact technology is blissfully quiet compared to dot matrix and character printers. (Because of the heat process, laser printers require built-in fans, which are the source of the only noise they make.)

Just like the Canon copier, the toner and the imaging scroll, or drum, are contained in a cartridge that is easily removed and replaced. The cartridges retail for around $100, and they should be replaced every 2,000 to 3,000 pages. The machines print on single sheets, 8½ by 11 or legal-size xerographic-quality paper, as well as bond stationery (in weights up to 20 pounds) and transparent acetates for producing overheads. The paper can be loaded in trays that hold up to 100 sheets at a time or hand-fed individually. These copierlike design features make laser printers relatively easy for nontechnical people to use.



Apple's LaserWriter



Hewlett-Packard's Laserjet

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AN UNBEATABLE TEAM AT AN UNBEATABLE PRICE! We've teamed the best with the best to make the greatest. The best keyboard enhancer, SuperKey®. The best desktop organizer, SideKick®. The dynamic duo working hand in hand to let you do many different things at once. A way that cuts down the keystrokes, so you're working instead of just typing. A way that wasn't possible until we paired the electronic wizardry of SuperKey with the practical efficiency of SideKick. SuperKey brings the magic. SideKick does the details. The "S-Team" works beautifully together because we designed them that way.

GET SUPERKEY AND SIDEKICK TODAY and you'll have an unbeatable team at an unbeatable price — and a $15 rebate back in the mail.



SIDEKICK INCLUDES: * Calculator * Notepad * Auto dialer & phone directory * ASCII table * Perpetual calendar & datebook * Help window * Full-screen editor with word-wrap, paragraph editing and much much more. (Chances are that once you have SuperKey and SideKick working together for you, you'll never need to use a word-processing program again).

SUPERKEY INCLUDES: *Encryption to keep confidential files confidential * Programmable keys that let you turn a thousand keystrokes into one * Keyboard lock * Automatic turn-off of your screen after a pre-set time so the expensive phosphorus in your monitor's screen isn't etched or ruined * Secret Password protection and more.

IF YOU USE SIDEKICK, YOU NEED SUPERKEY. BECAUSE SUPERKEY AND SIDEKICK CAN MAKE YOUR DAY GO SOMETHING LIKE THIS:

8:00 am. You got to work on time, despite the 44-mph turkey ahead of you in the fast lane. It's spreadsheet time. You hit one key. Lotus 1-2-3 (or whatever) is up and running. (One key, because SuperKey has recorded all the CD\123 <ENTER >123< ENTER> <ENTER> / F <ENTER> R <ENTER> SALES <ENTER> <PgDn> foolishness and your one keystroke played all that back instantly. One keystroke instead of a minuet).

8:03 am. You're into the spreadsheet. Phone rings. You kick in SideKick's Notepad—without leaving your spreadsheet. You talk. You listen to Frank. You make notes that tell you that Frank is upping the numbers from yesterday's order and he needs a new price and delivery date. He wants a meeting. Fast, but when? You have SideKick fire up your Calendar. Time agreed and noted—in SideKick's NotePad. Conversation ends. Your spreadsheet is still there.

8:07 am. You're watching the spreadsheet but you're thinking about the new bid you have to figure out. So you have SideKick's Calculator pulled up on the screen—over a small piece of the spreadsheet—which doesn't go away.

8:08 am. SideKick is coming up with new numbers. SuperKey keeps the spreadsheet on a roll. Satisfied with the numbers, you have SideKick auto-dial Frank's number. Talk. Talk. Hang up.

8:09 am. Spreadsheet about done. You're watching it, but thinking about what Frank just said on the phone. He liked your numbers. He ordered. He said, "That was fast. We won't need that meeting. (SideKick cancels it from your Calendar). And he also said, "How did you get all that done so quickly?" And you said, "I've got a couple of new guys working for me."

IF YOU DON'T USE SIDEKICK YET, YOU GET THEM BOTH AND FOR A LIMITED TIME, A $15.00 CASH-BACK! Because SuperKey and SideKick are so compatible, we let them move in together. Into their own blister-pack. With the $15.00 cash-back coupon and the manuals. Which is what you get for $139.90 instead of the usual $154.90. You need to fill-in the cash-back coupon, along with your registration cards and proof of purchase, and mail it back. We'll rush you your $15.00 rebate right away. Rebate offer ends March 31, 1986. (PS: You can still buy SuperKey and SideKick separately. SuperKey ***$69.95.*** SideKick ***$84.95.*** Not copy-protected.)

THE CRITIC'S CHOICE

"If you want the ultimate in sophistication, you won't find anything finer on the battlefield right now than Borland's SuperKey and SideKick combo." **LEON A. WORTMAN, InfoWorld**

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SideKick $54.95 (copy protected)	
SideKick $84.95 (not copy protected)	

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Amount Enclosed
Payment VISA MC BankDraft Check
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Card #

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SideKick only: PCjr requires the not copy protected version

$15 cash-back rebate upon receipt of signed license agreement, cash-back coupon and proof of purchase. Your $15 cash-back rebate includes tax when applicable. These prices include shipping to all U.S. cities. All foreign orders add $10 per product ordered.

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COD's and Purchase Orders WILL NOT be accepted by Borland. California residents add 6% sales tax. Outside USA add $10 and make payment by bank draft payable in US dollars drawn on a US bank.

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CIRCLE 520 ON READER SERVICE CARD

Low power

Complete hard disk kit $395

Comes complete with virtually the identical controller that's in the IBM®XT, and Xerox® warranties the hard disk for one year

Guaranteed 100 percent IBM PC compatible

How can we offer this fantastic price? Simple. We buy in such volume that even the most avaricious hard disk businessmen understand they have to give us the best price possible. We could pocket the difference, but we don't.

Instead, we put the extra profit into our testing facilities. That's why Xerox guarantees our $395 10 megabyte hard disk for one year.

Xerox knows, as our customers know, that we have an extensive testing program. Here is what we contribute toward giving you the maximum hard disk performance.

Best Drives Available

First, we buy the best drives available. Sounds trite, doesn't it? I mean, a drive's a drive—right? Hardly. You should see some of the junk we get in our labs. Some have such high failure rates that we even questioned our own $10,000 hard disk tester. But when we tested other manufacturers' drives we were assured that our equipment was fine, which just confirmed that the bad hard disks were not only bad—they were real bad.

But that's just the weeding out process. We then take each drive that we've put through our tester and test it again with the controller you've requested. We call this a "tested pair."

DOS Doesn't Do It

In case you're thinking that all this is an unnecessary duplication of what DOS does for you, let me explain the disk facts of life.

If DOS did what you may think it is supposed to do when you format the disk, DOS would map around these bad areas. Unfortunately, DOS doesn't do this.

DOS 2.0 and 2.1 can't enter the bad tracks. DOS 3.0 can, but only on the IBM AT. Unfortunately, as the press has so well documentated, the AT's hard disk develops bad tracks later on.

We do what DOS can't

We believe the problem is so bad, we use a software program that performs a powerful test of your disk drive on all of the IBM or IBM compatible computers—PCs, XTs, and ATs. Our format takes hours to analyze the disk. But when we finish, you know that the bad tracks are really mapped out so you won't write good data that will disappear into a black hole. We even send you a printed statement of our test results.

Our software allows you to type in the bad track locations from the list supplied by the manufacturers, so you'll never write good data to them—even if DOS didn't identify them as bad. The software even lets you save the location of these bad sections to a file, so that you can reformat your disk without spending hours retesting.

We even include a program that will give you continuous comments on the status of your hard disk. No more waiting for that catastrophic failure.

Average Access Time

As you might suspect, some hard disks are faster than others in their ability to move from one track of data to another. The time it takes the hard disk to move one-half way between the beginning of the disk to the end is called the "average access time."

The first generation of 10 megabyte hard disks had average access times of 80-85 milliseconds (msec). But computer users love speed, and guess what—the average access time for the new 20 megabyte hard disk in the IBM AT is only 40 msec. (We sell an AT equivalent with only 30 msec access time!)

There are some legitimate reasons for the shorter access time. It's particularly helpful when there are multiple users on the same hard disk. It's also important when running a compiler. But remember, before you get too wrapped up in the access speed, there's always that ST 506 interface which won't let data transfer from the hard disk to the computer any faster than 5 megabits/second. We've bypassed that choke hole, too. If you want the functional equivalent of a Ferrari with a turbocharger, order our 10 Mbit per second 100 megabyte hard disk with 18 msec of average access speed.

Compatibility

To be sure that your hard disk is 100 percent compatible with the IBM XT you don't need to buy the same hard disk that's in the XT. You can't even be sure what brand hard disk it is because IBM, like Express Systems, goes into the marketplace and buys hard disks from several vendors. However, they buy their XT hard disk controller from only one vendor—the same one we do.

You can buy the IBM XT controller from IBM for $495 or you can buy from us, the functional equivalent, manufactured by the same company that makes it for IBM for only $195. Is it the exactly identical IBM XT controller? No, it's better. First, it takes less power, and secondly, it can control from 5 to 32 megabytes—the IBM controller can work with only 10 megabytes. It is 100 percent IBM XT compatible, and 100 percent is 100 percent. If you want to save a slot, we carry a version that lets you operate two hard disks and two floppy disk drives.

More than 32 Megabytes

You can operate with more than 32 megabytes (the limit of DOS) through the use of "device drivers." Express Systems can supply you with device drivers for our hard disks for over 32 megabytes formatted. But, if you don't have individual files, or databases that are large, you might want to consider one of our controllers that can divide our 65 megabyte (formatted) hard disk into two equal volumes of 32 megabytes each.

Reliability

We offer you a choice between iron oxide and plated media—the stuff that covers the hard disk and gives it its magnetic properties. Iron oxide is,—well, it's rust. If you inadvertently joust your disk, you may cause the low flying head to dig out some iron oxide. A little rust flake can ruin your whole day. Plated media is more resistant to damage, and if it happens, less data is lost.

We offer both types of hard disks. The iron oxide is older



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technology, and quite frankly, manufacturers understand it better. Their better understanding, combined with some of the special head locking mechanisms, gives us peace of mind when we sell you one.

Power

Hard disks consume power. Our small, half-high hard disks consume so little power that you can use them with your existing IBM PC power supply. If you plan to use lots of slots, you'll want to increase your power supply to be safe. We offer the same amount of power for your PC that comes in the XT.

Our Customers

Some folks just never feel comfortable buying mail order. They forget that Sears began as a mail order house or that IBM is now into mail order. But, if it helps, here is a *partial* list of customers who have felt comfortable to buy from us.

IBM	Sears
American Express	Honeywell
U.S. Army	MIT
AT&T (Bell Labs)	RCA
Bausch & Lomb	Lockheed
Xerox	Sperry

Easy to Install

If you're like most of us, raised on the boob tube rather than the Great Books, you'd rather see the movie than read the book. Well, now you can choose to read our installation manual or for only $9.95 more, you can get a VHS or Beta video cassette showing the simple steps for installation.



Our VHS or Beta Cassettes make installation easy.

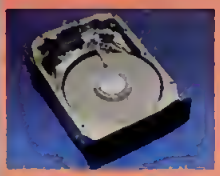
Warranty

We offer you a one year warranty on our hard disks—the same as IBM on the AT and 90 days on the tape drives. (It's all the manufacturer gives us.) If anything goes wrong with your tape or disk drive or hard disk, send it back in the box it came in. However, we have found that we can usually solve the problem over the phone. So call first for a return authorization number because we can't accept any returns without it.

Comes complete

All Express Systems products come complete with the appropriate software, tape and/or hard disk controllers, and cables where required. Hard disks are formatted and tested with the PC DOS of your choice. All drive sizes are formatted capacities.

If your application requires a stacking kit, power splitter cables, daisy chain cable, or some other variation, we'll supply these items at a nominal charge. We even ship our hard disks with Command Assist™ an on-line DOS-like manual to give you help with your DOS commands.











Complete Hard Disk Kits

Formatted MB	Height	Plated Media	Average Access	Transfer Rate	PC or PC/XT	AT
10	½	no	85 msec	5 Mbits/s	$ 395	$ N/A
10	½	yes	85 msec	5 Mbits/s	$ 495	$ N/A
21	½	yes	85 msec	5 Mbits/s	$ 795	$ 595
21	Full	no	30 msec	5 Mbits/s	$ 1,535	$ 1,340
32	½	yes	85 msec	5 Mbits/s	$ 995	$ 795
32	Full	no	30 msec	5 Mbits/s	$ 1,775	$ 1,575
65	Full	no	30 msec	5 Mbits/s	$ 2,295	$ 2,070
100	Full	yes	18 msec	10 Mbits/s	$ 4,995	$ 4,995

Removable Hard Disk

10	½	no	90 msec	5 Mbits/s	$ 1,095	N/A

Tape Systems and Subsystems

Formatted Storage Capacity	Height	Data Transfer Rate (k-sec)	PC or PC/XT	AT
60 Mbytes	½	88	$ 995	$ 995
60 Mbytes Subsystem		88	$ 1,295	$ 1,295
21 Mbytes (unformatted) Start/stop Subsystem		24	$ 595	$ 595
26 Mbytes Floppy Tape* Subsystem		31	$ 749	$ 749

Controllers

All of our hard disk and tape controllers are available separately: Please call for prices.

Subsystem Chassis

Any of our disk or tape units are available in an external subsystem for an additional $250.00. You can mix & match any of our ½ high hard disks or tape drives together or add any single full height hard disk.

Tape Cartridges

Express Certified 555 foot 310 Hci ¼-inch Data Cartridge — $35.00

Power Supply

130 Watt Power supply — $75.00*
150 Watt Power supply — $125.00

*with the purchase of any drive

More questions?

Because we spend so much attention on the front end with ensuring that our disks will arrive in working order, we have a customer service department that, unlike many of our competitors, has little to do. When you need us, you won't get a constant busy signal.

Call our friendly, knowledgable customer service staff to get answers to your questions—before or after the sale. Our people, who know the PC, can talk you through the sticky parts, and they'll respond to you quickly. Just call us.

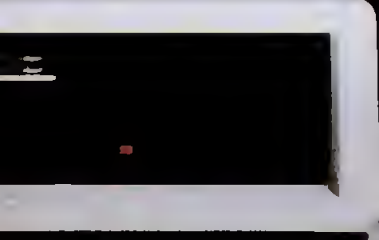
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Pick up the telephone and call 1-800-341-7549, to order. We accept Master Card, VISA, American Express and Diners Club. Or send a cashier's check or money order (We'll take a check, but you'll have to wait for it to clear) and tell us if you want one of our recommended configurations or you want to mix and match yourself. Corporations with a DUNS number may send purchase orders for quantities over five.

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HIGH-END LASER PRINTERS

If you're in the market for top-quality output and you have a budget that knows no bounds, take a look at these manufacturers' state-of-the-art machines.

Dataproducts Corp.

Dataproducts Corp. markets largely to OEMs and VARs. It has exclusive rights to the 26-ppm Toshiba engine, which seems to be a "Harley-Davidson" of a printer engine. It has three machines—one in the $13,000 price range, one that offers Diablo 630 emulation for around $15,000, and a PostScript-driven machine for around $23,000. Offices that produce a high volume of business letters or reports will find the speed of this line well worth the admittedly substantial investment. (6200 Canoga Ave., Woodland Hills, CA 91365, (800) 258-1386 or (818) 887-8000)

IMAGEN Corp.

IMAGEN Corp. makes three levels of machines using three different laser engines (Canon, Ricoh, and Xerox). The company was founded to exploit technology developed at Stanford University on a real-time rasterization process for controlling placement of dots on a page that uses only 1 to 2 percent of the memory required by the more commonly used full-page bit-mapping process. IMAGEN has an exclusive patent for the process from Stanford. Its current line of printers came out in 1984. About 50 percent of its business is with OEMs; the other 50 percent of sales is to end users. Its market is divided among technical publishing, CAD/CAE, and graphic arts (especially as machines to produce quick proof). The printers use the imPRESS language. (2650 San Tomas Expwy., Santa Clara, CA 95052, (408) 986-9400)

QMS Inc.

QMS Inc. is known for its Lasergrafix series printers that were introduced in 1982. These printers use a control-code language called QUIC; you can embed these codes in any text sent to the printer to select fonts, draw boxes, set line spacing, and so on. The 800 is a desktop printer with a Canon engine—the larger, standing models 1200 and 2400 use Xerox engines. The lower-priced desktop is popular in offices, while the 1200 and 2400 models are often found in engineering departments. (1 Magnum Pass, Mobile, AL 36618, (205) 633-4300)

Xerox

Xerox was one of the first manufacturers to emphasize laser technology. Its $20,000 to $40,000 line includes the 2700, a desktop printer with a copier option; the 4045; and the 3700. Two more elaborate models, the 8700 and the 9700, are priced at about $300,000 and $500,000, respectively. The Xerox printers output faster than printers that use the Canon engine. Xerox's low-end model 4045 is advertised to print 10 pages per minute—25 percent faster than the Canon. These printers use the UDK (user-defined key) method to flag the printer. (Printing Systems Div., 880 Apollo St., El Segundo, CA 90245, (213) 536-7000)

The Canon engine can print at a rate of eight pages of text per minute—much faster than the 2-ppm rate (or lower) of standard dot matrix and character printers, but still much slower than higher-priced, high-speed laser printers that can print up to 24 pages per minute (see sidebar, "High-End Laser Printers). In addition, some programs take longer than others to compose a page for printing, and pages with a lot of font changes or graphics always take longer to print.

The engine can produce text and graphics at a resolution of 300 dots per inch (dpi). This resolution is higher than the Epson FX-80's 120 dpi resolution but still a great deal coarser than the resolution of typesetting machines, which fill in type at 1,000 to 2,400 dpi. Nevertheless, 300-dpi resolution eliminates the "jaggy" edges usually associated with computer text and graphics, to the extent that some of the type fonts available through laser printers look like authentic typesetting to the average reader.

While the maximum speed and resolution are determined by the Canon engine, the actual capabilities of each printer are controlled by the processing chips (ROM) and extra memory (RAM) added by Hewlett-Packard or Apple. After speed, the added chips are the main factors in the price differential between laser printers, and they determine how the source image is translated into optics. The ROM chips hold processing code that interprets the information that comes over the cable from the PC and tells the laser engine how to compose the image in dots (pixels). The amount of RAM determines how many pixels can be on one page.

These laser printers can print a variety of type fonts on one page subject to two restrictions: The font definition must be stored in the printer itself and the text program must know how to identify different fonts through the language chosen by the printer manufacturer. Some printer languages have greater capabilities than others for defining type fonts and formatting graphics. However, until there is one generally accepted page-composition language, application programs will need to include a different driver or conversion program for each laser printer they support. Drivers for these printers are included with some of the page-composition systems available for the PC (described in "Page Design on the PC Screen" in this issue). Files created with other text-processing programs may require special conversion programs in order to translate their conventions for formatting commands—such as bold and underscore—into the printer's language.

Hewlett-Packard's Laserjet

Hewlett-Packard adds 4K bytes of memory to the basic Canon engine. This memory can be addressed through HP's Printer Control Language, allowing upward compatibility for programs that use PCL to address HP's other printers, such as the ThinkJet. Though the laser engine is capable of printing at 300 dpi, graphics are printed at 75 dpi unless the source program

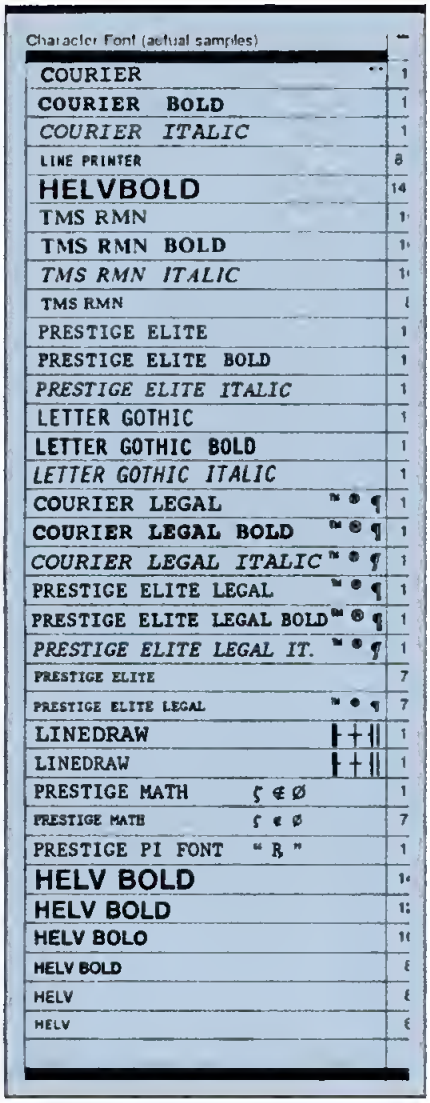


Figure 1: *A total of ten fonts are available for the Laserjet printer.*

addresses the Laserjet's Printer Control Language directly.

The printer itself is fairly simple to install—a matter of hooking a cable between it and the PC. You also must insert the paper tray. The procedure for installing the toner cartridge is clearly explained in the printer manual as well as in the instructions that come with the cartridge. Finally, a MODE command is used to set the parameters for the serial port, as explained in the manual. You can hook up a network of PCs to the Laserjet through a networking package such as Omninet by Corvus Systems.

The Laserjet comes with Courier as a built-in font, accessible through any word processing package (Figure 1). You can add Letter Gothic and Prestige Elite (both typewriter fonts), typeset-quality Times Roman and Helvetica, Line Printer (compressed) font, legal symbols, math symbols, a line drawing font (for forms), and bar code. These ten fonts are offered in various combinations on 20 different cartridges that cost from $225 to $400 each.

PC FACT FILE

LaserWriter
Apple Computer Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010
List Price:$6,995
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Laserjet
Hewlett-Packard Co.
1820 Embarcadero Rd.
Palo Alto, CA 94303
List Price: $3,995 for Laserjet Plus, $2,995 for Laserjet
CIRCLE 645 ON READER SERVICE CARD

```
This paragraph demonstrates the courier font. It is a fix
pitch font. This is bold courier. This is italic couri
This is 10 point courier. This is 12 point courier (w:
bold).
```

This paragraph demonstrates the Times Roman font in 12 point size. It is a propo spaced font. This text is 10 point. This 10 point Times Roman would be ideal for multipl printing, such as a newsletter. This is the same font and size in bold. *This is the same font point size and italic.* The last Times Roman font is 8 point. It is very small and can be used for footnotes and fine pri

The Helvetica font is useful for headings and titles. The top line on this pag point. The second line is 18 point and this paragraph is 12 point. This is helvetica. *This is italic helvetica.*

Figure 2: *These samples of the Apple LaserWriter's built-in fonts were produced on the LaserWriter using* Microsoft Word.

You are limited to a maximum of eight different fonts per page—the most variations that one cartridge can hold. Style variations include plain, bold, italic, and orientation (vertical or horizontal). For example, one cartridge includes 12-point Plain Courier (vertical and horizontal), 12-point Courier Bold and Italic (vertical only), and 8½-point Line Printer (horizontal only).

The Laserjet works well with *Microsoft Word,* which can take advantage of the printer's cartridge fonts. Other programs may require additional codes and conversion programs in order to access different fonts. Over 150 programs are listed as compatible with the Laserjet, including three UNIX-based word processing programs, but you also need an interface program to drive the Laserjet from most of these applications. Various interface programs are available—each specific to the application program you are using. For example, two different vendors offer software that translates *WordStar*'s formatting commands into the Laserjet's Printer Control Language and adds new commands for font selection.

ScenicWriter, Studio Software's *DO-IT,* and Bestinfo's *Superpage* are three page-composition systems that drive the Laserjet, and some other manufacturers promise Laserjet versions in the future.

The recently released Laserjet Plus comes with 512K bytes of built-in memory (117K ROM, 395K RAM), allowing room for access to as many as 32 downloadable fonts at a time plus one set of cartridge fonts in sizes from 6 to 30 points. This feature will be especially useful in a multiuser environment requiring many fonts. However, you are limited to 16 different fonts per page. New PCL escape codes will let you select solid rule lines, shading, and fill patterns for graphics, and you can print full pages of graphics at 150 dpi or half pages at 300 dpi. Macros can be loaded into the Laserjet Plus to store up to 32 different forms. This means you can use the Laserjet Plus as an invoicing system at a service counter, or in an accounting department to print an invoice form (filled in with the particulars of the purchase), or do a letter with a graphic letterhead—or one right after the other. Any program that works with the Laserjet is upwardly compatible with the Laserjet Plus.

Hewlett-Packard lists seven word processing programs, six graphics programs, and three page-formatting programs that can address Laserjet Plus's enhanced features, and you can expect more in the future.

Apple's LaserWriter

Apple Computer's LaserWriter is one of the most sophisticated laser printers available in its price range. Apple adds a 12-MHz Motorola 68000 microprocessor, more than half a megabyte of ROM, and no less than 1½ megabytes of RAM to the basic Canon engine. All this additional memory helps support a built-in software language, created by Adobe Systems,

Laser Printers: Summary of Features

Manufacturer	Product	Base price	Resolution (dots per inch)	Pages per minute	Engine	Graphics
Apple Computer Inc.	LaserWriter	$6,995	300	8	Canon LBP-CX	full page, 300 dpi
Hewlett-Packard Co.	Laserjet	$2,995	300	8	Canon LBP-CX	75, 100, 150, or 300 dpi (75 is default)
Hewlett-Packard Co.	Laserjet Plus	$3,995	300	8	Canon LBP-CX	full page, 150 dpi; half page, 300 dpi
Dataproducts Corp.	LZR 2610	$12,900	300	28	Toshiba	no
Dataproducts Corp.	LZR 2630	$14,900	300	26	Toshiba	no
Dataproducts Corp.	LZR 2665	$22,900	300	26	Toshiba	yes
IMAGEN Corp.	IMAGEN 8/300	$8,950	300	8	Canon LBP-CX	yes
IMAGEN Corp.	IMAGEN 12/300	$15,800	300	12	Ricoh	yes
IMAGEN Corp.	IMAGEN 24/300	$29,950	300	24	Xerox	yes
QMS Inc.	Lasergrafix 800	$7,995	300	8	Canon LBP-CX	yes
QMS Inc.	Lasergrafix 1200	$19,995	300	24	Xerox	yes
QMS Inc.	Lasergrafix 2400	$29,995	300	24	Xerox	yes
QMS Inc.	Smart Writer	$3,850	300	8	Canon LBP-CX	limited
Xerox Corp.	2700II	$18,000	300	12	Xerox	yes
Xerox Corp.	4045 Copier/Printer	$5,000	300	10	Xerox	bit-mapped; full page, 150 dpi; half page, 300 dpi

called PostScript (see sidebar, "The Premier Page Composition-Language"). The printer also comes with AppleTalk, Apple Computer's own lost-cost network system, and an RS-232 serial port that emulates the Diablo 630 daisy wheel printer.

Though the LaserWriter was developed as a part of the Macintosh office system, an increasing number of IBM PC software and hardware manufacturers have released products that can "talk" to this printer. PCs can be hooked up to the LaserWriter through either a serial port or through the built-in AppleTalk network system. Installing the Apple LaserWriter through the

Fonts	Memory	Languages	Maximum paper size (inches)	Input tray (pages)	Interface
4 built in (Times, Helvetica, Courier, Symbol)	2 Mbytes (0.5 Mbyte RAM, 1.5 Mbytes ROM)	PostScript	8.5 × 14	100	serial, AppleTalk
Courier built in, plus cartridges	4K	PCL (HP's Printer Control Language)	8.5 × 14	100	serial
32 downloadable, plus cartridges	512K (117K ROM, 395K RAM)	PCL	8.5 × 14	100	serial
8 built in	512K	line printer emulation only	11 × 17	2,000 in 500 out	serial or parallel
8 resident; 64 downloadable	512K	Diablo 630	11 × 17	2,000 in 500 out	serial or parallel
13 built in; any number downloadable	2.5 Mbytes	PostScript, Diablo 630	11 × 17	2,000 in 500 out	serial or parallel
Lucida, Times, Modern, Helvetica/ Printer, or host resident	1 Mbyte (up to 3 Mbytes possible)	imPRESS, Diablo 1640 emulation, Techtronics 4014	8.5 × 14	100	serial, parallel
Lucida, Times, Modern, Zurich, Helvetica/Printer, or host resident	1 Mbyte (up to 3 Mbytes possible)	imPRESS, Diablo 1640 emulation, Techtronics 4014	8.5 × 11	250	serial, parallel
Lucida, Times, Modern, Zurich, Helvetica/Printer or host resident	2 Mbytes (3 and 4 Mbytes possible)	imPRESS, Diablo 1640 emulation, Techtronics 4014	11 × 17	2,000 in 500 out	serial, parallel
12 built in; any number downloadable	2.5 Mbytes	QUIC resident, C, COBOL, FORTRAN, RPG, PL/I, Pascal transparent to host	8.5 × 14	100	serial, parallel, IBM minis
12 built in; any number downloadable	2.5 Mbytes	QUIC resident, C, COBOL, FORTRAN, RPG, PL/I, Pascal transparent to host	8.5 × 14	500 in 500 out	serial, parallel, IBM minis
12 built in; any number downloadable	2.5 Mbytes	QUIC resident, C, COBOL, FORTRAN, RPG, PL/I, Pascal transparent to host	11 × 17	2,000 in 1,000 out	serial, parallel, IBM minis
7 resident, plus cartridges	384K	Diablo, QUME, Epson emulation	8.5 × 14	100	serial, parallel
cartridge	256K	Diablo 630, Xerox	8.5 × 8.14	500 in 500 out	serial, parallel
cartridge	128K or 512K	Diablo 630, Xerox	8.5 × 8.14	250 in 100 out	serial, parallel

IBM PC's RS-232 port is fairly straightforward—you make the cable connection and use the MODE command to set the parameters for baud rate, parity, and so on. These settings are not described in the manual for the LaserWriter, unfortunately, but luckily the manual for *Microsoft Word* includes them.

Apple Computer promises a card for the PC that will allow it to use the AppleTalk network sometime later this year. Meanwhile, Tangent Technologies already makes a card called PC-Mac Bridge that fits into an expansion slot of any PC or compatible and allows you to connect a PC to the AppleTalk network and thereby address the LaserWriter through the AppleTalk port. (For more information about Tangent Technologies' PC-Mac Bridge, see the sidebar, "The PC Learns AppleTalk.") Built into the LaserWriter's ROM, AppleTalk lets you hook up as many as 30 terminals to one LaserWriter. Although speed of access and printing is likely to suffer under heavy use, this multiple-terminal hook-up capability makes the LaserWriter's $7,000 price tag seem more economical. If you serve seven terminals from one LaserWriter, the cost is equivalent to as many letter-quality printers; if you serve a dozen, the cost is equivalent to as many dot matrix printers.

Most text files can access the printer's built-in fonts either directly or through a utility program that translates the file for PostScript. The LaserWriter can be driven by any page-composition program that creates PostScript files, including versions of *ScenicWriter*, *MagnaType*, and *DO-IT*.

The LaserWriter comes with four built-in fonts (Courier, Times, Helvetica, and Greek math symbols). Figure 2 demonstrates the versatility of these typefaces. Adobe Systems will be releasing more typefaces for the LaserWriter this fall, including ITC Bookman, Souvenir, Palatino, New Century Schoolbook, American Typewriter, and Zapf Chancery—all licensed from Linotype Corp. Text produced with existing word processing packages can be printed directly through the LaserWriter in 12-point Times Roman, and PostScript commands can be added to any ASCII file to access the other fonts currently available.

The LaserWriter itself can handle font sizes from 4-point to 127-point, though not all programs take advantage of the full range. Any font can be printed as plain text (roman), bold, and italic, and there is no limit to the number of fonts you can include on a page. With PostScript's ability to describe pages of text and graphics elegantly, it's not surprising that page-composition systems would be among the first type of package to appear from the PC world for the LaserWriter. With the new fonts licensed from Linotype coming out soon and as more typesetting manufacturers add PostScript machines to their lines, it's likely that we'll see more software manufacturers coming out with sophisticated PC programs that drive the LaserWriter. ■

THE PC LEARNS APPLETALK

The PC-Mac Bridge makes the power of the Apple LaserWriter available to 1-2-3, MultiMate, Microsoft Word, and WordStar PC users.

PC-Mac Bridge lets the PC talk AppleTalk. This Tangent Technologies card fits into any PC expansion slot and lets you print text files created with *WordStar*, *MultiMate*, *Microsoft Word*, and *1-2-3* directly to the Apple LaserWriter.

Once the card is installed, a standard AppleTalk connector can be attached to the PC as it would be to a Macintosh. The accompanying software, called *LaserScript*, converts files created in *WordStar*, *MultiMate*, and *1-2-3* into PostScript format. It can also be run on any ASCII file to print Courier type on the LaserWriter in whichever type size you choose. In *WordStar* documents, you can use *WordStar*'s alternate-pitch command (Ctrl-PA) to select 16-point Times Roman. Other print commands, specified in the *LaserScript* manual that comes with PC-Mac Bridge, can be used to select either Helvetica (Ctrl-PY) or Courier (Ctrl-PW).

LaserGraph, a business graphics program from Tangent Technologies written in PostScript, is also included with PC-Mac Bridge and lets you embed graphics in *WordStar* documents.

PC-Mac Bridge successfully printed a 100-page manual in *WordStar*, using mostly Times Roman with alternative font sizes. Tabs were the only problem: *WordStar*'s normal "vari-tabs on" mode inserts space characters between columns when the Tab key is pressed. This method works well when you are printing in the monospaced (nonproportional) Courier font. The same columns become uneven when printed in a proportionally spaced font like Times Roman or Helvetica. You must use *WordStar*'s hard tabs, produced with the vari-tabs off mode; to get the proper tab settings in these fonts. We ended up setting the tabular material in Courier to get around this problem, rather than taking the more troublesome alternative of resetting the tabs in every table.

You can send PostScript commands to the laser printer from within *WordStar* files using the dot command .^CMD or pull in a file containing PostScript commands during the printing process with the command .^FILE. This particular technique may be tedious, but it is certainly very useful.

Whether you do your word processing on the cutting edge with *Microsoft Word* or stick with an old favorite such as *WordStar*, the power of the Apple LaserWriter is now available to you with the PC-Mac Bridge.

—Diane Burns and S. Venit

PC-Mac Bridge
Tangent Technologies
5720 Peachtree Pkwy., #100
Norcross, GA 30092
(404) 662-0366
List Price: $595
Requires: 256K RAM, an AppleTalk node connection.

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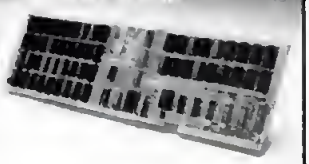
This board is functionally equivalent to the IBM Printer Adapter, Asynchronous Communications Adapter, enough memory expansion to equal 384K, and a clock card. Plus comes with software that allows an extra 640K of Virtual Memory (can be used with fixed or RAM disk and Lotus/Intel/Microsoft specification software). For IBM PC/XT and compatibles

2. GL 640+2MB BOARD



This board provides up to 2 megabytes of paged RAM memory for use with Symphony 1.1, Lotus 1-2-3 (2.0 version), and new versions of Framework, SuperCalc and other programs that use the Lotus/Intel/Microsoft expanded memory specifications. It is shipped with Disk Emulation and Printer Spooler software

3. GL 0-384K ULTRAFLEX MEMORY BOARD



The GL 0-384K Ultraflex Memory Board does more than just provide up to 384K of extra memory. In addition to print spooling, this board comes with software that allows an extra 640K of Virtual Memory (can be used with fixed or RAM disk and Lotus/Intel/Microsoft specification software). For IBM PC/XT and compatibles

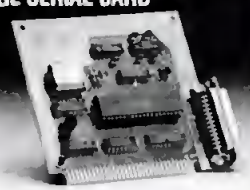
4. GL COLOR GRAPHICS BOARD



5. GL MONOCHROME DISPLAY WITH SERIAL/PARALLEL



6. GL SERIAL CARD



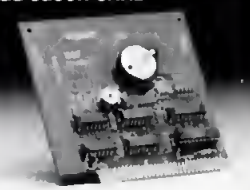
7. GL PARALLEL CARD



8. GL SERIAL/PARALLEL CARD



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CIRCLE 278 ON READER SERVICE CARD

PCs AND TYPESETTERS: A MIXED MARRIAGE

Thanks to front-end software, PCs can now drive typesetters and laser printers directly, generating both reproduction-quality copy and real cost savings.

Until recently, if you wanted to typeset text that you had keyed into a PC, you had to telecommunicate it to a typesetting terminal for further processing. Now, software for the PC lets you use the PC itself as a typesetting terminal; it allows direct hookups between PCs and typesetting equipment. These packages cost under $5,000—and include the PC. (Typesetting manufacturers are accustomed to asking $8,000 or more for front-end terminal systems that tie into their specific brand of typesetting equipment.) This is good news for businesses that currently do a lot of typesetting as well as for typesetting shops that want to add low-cost terminals to their configurations.

Many of these software packages can also drive the new low-end laser printers instead of typesetters. These printers can produce 300-dot-per-inch characters that look like actual typeset characters to the average reader. Even higher-resolution laser printers are now coming on the market. The availability of low-end typesetting terminals and laser printers is leading many corporations to gradually shift away from commercial typesetting toward in-house production of corporate material, from departmental procedures manuals to quarterly financial statements and brochures.

The marriage between PCs and typesetting equipment is potentially threatening to traditional typesetting houses as well as typesetting-equipment manufacturers. Typesetting houses are worried that they may lose some of their corporate clients. Equipment manufacturers are concerned that they are losing their "exclusive" contracts with typesetting shops. But the net effect for in-house and small-press publishers is that the cost per word of typeset copy is rapidly falling.

One of the reasons why typesetting equipment has been so expensive is that a lot more goes into producing a typeset character on a page than simply striking paper with a raised letter. So-called first- and second-generation phototypesetting equipment were really electromechanical devices that included physical prototypes of each character. Their manufacture included an elaborate assembly of mechanical parts, and in many cases, makers would begin the assembly process only when an order was placed—resulting in rather long delivery cycles. Furthermore, these systems usually incorporated all of the processing code in the typesetting equipment, with a "dumb" terminal connection for entering text and commands. These older systems could not be networked.

The third generation introduced truly electronic, CRT-based fiber-optics typesetting equipment, in which each character is "painted" as a fine, high-resolution pattern of dots on a drum—usually over 1,000 dots per inch. One of the first machines in this group was Compugraphic's EditWriter, which came out in 1976 and changed the industry: it was the first low-cost typesetter and launched a serious shift in corporate publishing away from large, outside typesetting facilities toward smaller, in-house plants. Machines in this category are usually "slave" typesetters: all processing takes place through the peripheral terminals; the typesetter itself has no memory or processing chips, and all fonts are stored on floppy disks. Slave typesetters—the kind most PC-based systems drive—can be networked. Even if you need one dedicated terminal to drive the typesetter itself, this networking ability significantly reduces the per-terminal cost of typesetting.

Fourth-generation typesetting is a laser-based technology: Rather than painting one character at a time, the laser paints a line at a time on photosensitive paper, scanning the drum with a beam of light.

TYPESETTING EQUIPMENT INFORMATION

For more information on the typesetting equipment mentioned in this article, contact the following companies:

AM International Inc. (Varityper)
11 Mount Pleasant Ave.
East Hanover, NJ 07936
(800) 631-8134
(201) 631-8134

Autologic (Volt Information Services)
1050 Rancho Conejo Blvd.
Newbury Park, CA 91320
(815) 498-9611

Compugraphic Corp.
200 Ballardvale St.
Wilmington, MA 01887
(800) 452-4526

Linotype Co.
425 Oser Ave.
Hauppauge, NY 11788
(516) 434-2000

Amazingly, equipment using this improved technology is priced at the low end of the scale.

WYSIWYG with Simplified Codes

One of the innovations introduced by PC-based software is a simplified coding structure for changing type fonts and text formats. Typesetting machine operators are full of war stories about the old, complex typesetting codes. For example, one wrong character could sometimes cause the typesetting equipment to freeze in the middle of a job. In some cases, the operator would create a magnetic tape on the terminal and then move the tape to the typesetting equipment. If anything went wrong, the tape would have to be brought back to the terminal, and the operator might have to look through the text for hours trying to find the errant code.

Many typesetting terminals now offer some form of what-you-see-is-what-you-get (WYSIWYG) preview screen, but the screen is not interactive: the operator still enters cryptic typesetting codes in an entry area of the screen rather than working directly with the preview image.

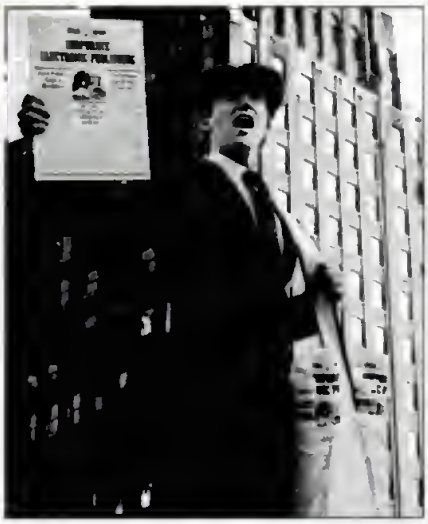
Not only do many PC-based systems simplify or menu the codes, they often offer interactive WYSIWYG screen processing. The operator can see the results of coding directly on the screen and make the needed corrections before printing out on photosensitive paper.

Equipment Options

Like the microcomputer market, the typesetting equipment market is dominated by a few large companies. Manufacturers of typesetting software for the PC have focused on including drivers for equipment for four manufacturers in particular: Linotype, Compugraphic, Autologic, and AM International. (Recently, the boom in laser printers has pushed a number of microcomputer printer manufacturers to enter the typesetting market as well.)

Linotype Co. (formerly Allied Linotype or Merganthaler) has a worldwide reputation for high-quality, high-end typesetting equipment and owns the rights to many of the fonts used in laser printers. Until recently, Linotype let other manufacturers cater to the low-end market, but it now offers a new line of its own equipment, tailored to the in-house publishing market that runs from PC or Macintosh terminals.

Linotype has three lines of equipment that can be driven by the PC, ranging in price from $17,000 to $60,000. The 100 and soon-to-be-released 300 lines are laser-based typesetters; the 200 series is CRT-based. Different models in the 100 and 300 series use Linotype's Cora command language or Adobe's PostScript language. Linotype is a value-added retailer for *PagePlanner*, a page composition system that runs its model 202. You can print *Microsoft Word* files to Linotype's models 100 and 101. Linotype's *LinoWord* program lets *Word* drive the 202 and adds automatic hyphenation and justification for *Word* files. (Microsoft plans to release its own hyphenation-and-justification version of *Word* in the future.) G.O. Graphics' *Horizon Series* software drives Linotype's 101 and 202 from the PC. Other programs that can drive Linotype equipment from a PC include Studio Software's *DO-IT* and Bestinfo's *Superpage*. (For more information on these and other front-end programs, see "Page Design on the PC Screen" in this issue.)



Not only do many PC-based systems simplify the codes, they often offer interactive WYSIWYG processing. The operator can see the results of coding directly on the screen.

Compugraphic Corp. is currently the largest manufacturer in the world, and like Linotype, it makes one of the first systems supported by vendors of PC-based typesetting and page-composition systems. Compugraphic is still number one in in-house typesetting department sales. Most PC-based typesetting software is geared to address Compugraphic's models 8400 and 8600. Programs that drive Compugraphic equipment include *MagnaType*, *Horizon Series*, *DO-IT*, *PagePlanner*, and *Superpage*.

Autologic has a reputation for very high- tech equipment. The company came out with a full-page composition system for text and graphics (composed of keyboard characters) in 1977, but its price and those of its other models has been too high for most budgets—only large publishers and typesetters could afford it. The company recently introduced the APS-55/200 plain-paper laser typesetter, the low-end member of its series of page-image processors. Autologic systems do not offer the same wide selection of typefaces available for other typesetting equipment, but they can be driven from a PC running *PagePlanner*, *DO-IT*, or *Superpage*.

AM International Inc. sells equipment under the Varityper name in the lower end of the price range. Its line is relatively easy to use and popular with the in-house and government publishing markets. The company makes its own page-composition software, called *MAXX*, for the IBM PC. The AM Varityper Comp/Edit 6400 CRT phototypesetter can also be driven from a PC with *Horizon Series*, *PagePlanner*, *DO-IT*, and *Superpage* software.

The match between PCs and typesetting equipment introduces some new concerns for commercial typesetting shops and typesetting equipment manufacturers. On the other hand, the only controversy for in-house publishers is whether these new systems are as easy to learn and use as their makers claim. ■

(continued on page 202)

It was a dark and stormy night.

The rain crashed against the plate glass windows harder than an errant drive-head on a search and destroy mission.

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- ✓Framework II call

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- ✓PC/Fixed Asset System 3.0 329.

Bible Research
- ✓THE WORD 3.0 *(KJV Bible)* 145.
- ✓THE WORD 3.0 *(NIV Bible)* 145.

Borland International
- ✓Turbo Tutor 1.0 19.
- ✓Turbo Databasa Toolbox 1.1 30.
- ✓Graphics Toolbox 1.0 30.
- ✓Superkey 1.1 37.
- ✓Turbo Pascal 3.0 37.
- ✓Turbo Editor Toolbox 1.0 37.
- ✓Turbo Gameworks 1.0 37.
- ✓Turbo Newpak 52.

 Turbo Gameworks and Turbo Editor.
- ✓Sidekick 1.5 *(copy-protected)* 30.
- ✓Sidekick 1.5 (non-protected) 48.
- ✓Reflex 1.0 57.
- ✓Turbo Pascal 3.0 w/BCD 59
- ✓Turbo 8087 3.0 59.
- ✓Turbo 8087 3.0 w/BCD 72.
- ✓Holiday Pek 67.

 Turbo Pascal 3.0, Turbo Tutor and Turbo Database Toolbox.
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- ✓Diagram-Master 5.0 207.
- ✓Sign-Mastar 5.1 157.

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- ✓GEM Collection 1.0 *(includes Desktop, Paint, Write)* 119.

Dow Jones
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- ✓Spreadsheet Link 145.
- Membership Kit 19.

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Evergreen
- ✓One Write Plus 1.0 169.

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- ✓Sideways 3.0 39.

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- ✓Freelance 189.

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- ✓Harvard Total Project Managar 1.0 279.

Human Edge
- ✓Mind Prober 27.

IMSI
- ✓PC Paintbrush 2.8 35.

Infocom
- ✓Cornerstone 1.0 279.

Lifetree
- ✓Volkswriter Deluxe 2.2 *(with TextMerge)* 159.
- ✓Volkswriter Scientific 1.0 289.

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- ✓ThinkTank 2.0 109.
- ✓Ready 1.0 49.

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- ✓Managing Your Money 2.0 99.

Micropro
- ✓Easy 1.0 97.
- ✓WordStar 3.31 179.
- ✓WordStar Propak 3.31 259.

 Hard disk recommended for Wordstar 2000 & Wordstar 2000 Plus
- ✓WordStar 2000 1.01 259.
- ✓WordStar 2000 Plus 1.01 299.

Microrim
- ✓Extended Report Writer 1.2 85.
- ✓Clout 2.0 135.
- ✓R:base 5000 1.0 369.
- ✓Upgrade Kit to R:base 5000 129.

Microsoft
- ✓Multiplan 2.0 119.
- ✓Microsoft Word 2.01 *(w/Ready)* call

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- Basic Compiler 5.36 ... 235.
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- Remote 1.2 ... 95.
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- MultiMeta 3.31 ... call
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- Norton Utilities 3.1 ... 59

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Software Group

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- PFS:Access A:00 ... $84.
- PFS:File B:01 ... 84.
- PFS:Graph B:01 ... 84.
- PFS:Plan A:01 ... 84
- PFS:Writa C:00 (w/PFS:Proof) ... 84
- First Success *(Combo Pack includes PFS:Write, Proof, Plan, File)* ... 229

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Unison

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- Printmastar 1.1 ... 37.

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Tallgrass Technology
TG 5025-25 Meg Hard Drive w/controller and 60 Meg Backup Unit call

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PCs PAGINATE USA TODAY

Front-page editor Ray Gniewek writes an efficient and cheap compiled BASIC layout program for USA Today.

Electronic page layout, or pagination, is all the rage in the newspaper business these days. Many dazzled editors are investing in dedicated hardware and expensive software in a big way, believing they are the only path to pagination's speed and flexibility.

To which Ray Gniewek can only say: Stop the presses!

Gniewek is the front-page editor of *USA Today*, the slick national newspaper based in Arlington, Virginia, and is also an accomplished programmer with a degree in computer science from the State University of New York College at Brockport. Dissatisfied with both the old razor-blade-and-wax layout method and the new, expensive, and often user-hostile computer pagination systems, Gniewek decided to improve *USA Today*'s method. So, shortly after starting at the paper in 1982, he spent 6 months writing a 64K-byte compiled BASIC pagination program that works on a PC with 256K bytes of RAM. It has been used to lay out the newspaper's front page for more than a year and seems to be just what Gniewek claims it is: an efficient, flexible, fast, cheap, and easy-to-use newspaper-layout program.



Ray Gniewek on-line with the newspaper-layout program he designed.

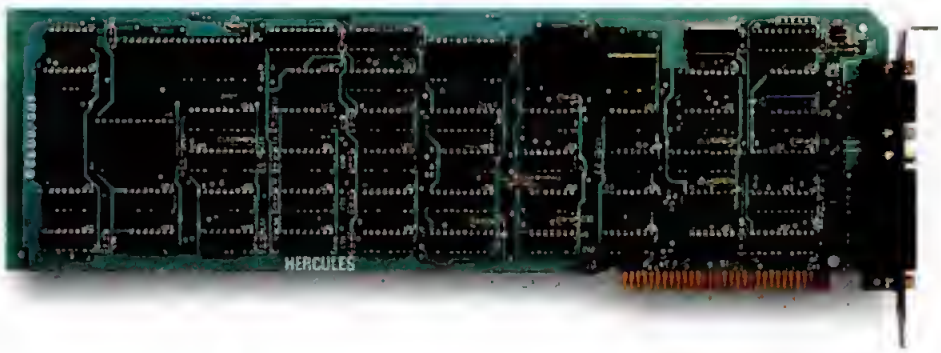
The program begins with a graphic representation of the front page: a vertically oriented rectangle divided into five columns. You just plug elements into the columns, using a simple code. For example, at the top of the left-hand column, you might type H42/4. *H* stands for headline, 42 is the point size of the headline (a 42-point headline is made of letters that are about ½-inch tall) and 4 is the number of columns the headline would span—this would be a big headline for a lead story. Other codes stand for other elements: *A* for art, *B* for box, and so on.

After you type in all the codes for the elements on the page, it determines how much space can be allotted for each element—the space is figured in typeset lines. If you want an enclosed box in the lower-left-hand corner but have not decided how big that box should be, you can enter a code signal indicating that the size is a dependent variable. After other elements, such as headlines, bylines, and story texts are arranged around that box, that variable automatically shifts to a hard figure. If two or more variables should remain, they will blink. "It's telling you that you've got to make a choice," says Gniewek.

The finished encoded page is then electronically combined with stories that *USA Today* reporters have written on their terminals. The PC assigns each story a position code that will fix its position on the page to an accuracy within $1/720$ of an inch. The position-coded stories are then sent to the ATEX 9000 mainframe and then on to the phototypesetting machines, which spit out the stories arranged onto a camera-ready page. This page is then broadcast to *USA Today*'s 30 printing plants around the nation. Gniewek estimates this system saves at least a half hour each night compared with the old razor-blade-and-wax layout routine. "We try to get the latest breaking news we can, so editors love the fact that this buys them time," Gniewek explains.

Considering his program's myriad virtues—on top of everything else, it is so easy to use that an editor who calls herself "a total non-computer person" learned it in 3 days—Gniewek seems quite cavalier about its commercial possibilities; he has not tried to market it or even bothered to name it. Perhaps he is blasé because he has nearly completed a new program in Turbo Pascal that is mouse-driven and promises to render the old one obsolete. "Just take the mouse, mark the upper-left-hand and lower-right-hand corners—click,click," he says with a grin.—**Brad Lemley**

Brad Lemley is a Washington, D.C.–based free-lance writer.



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PAGE DESIGN ON THE PC SCREEN

Companies with one or more PCs can now put away their knives and glue. These seven page-composition programs bring design, coding, and editing in-house.

In book, magazine, and newspaper publishing, page layout—the selection of typestyles and the arrangement of text and graphics on a page—is a studied art with a long history. In corporate documents, however, page design has always followed one accepted standard: All text is set in one typeface with roughly 1-inch margins all around. Until recently, professional page-composition artists and corporate publishing departments had little in common. A pitch to one is a point to the other; inches and picas are worlds apart. But new tools for typeface selection and page composition are now bringing the two groups together at the PC keyboard.

Page-makeup software is helping corporate publishing departments design easy-to-scan reports, easy-to-reference instructions, and easy-to-use forms. The programs fall into two categories: Typesetting front-ends that let you enter codes to select type fonts, change margins, and define such simple graphics as lines and boxes; and full-page composition systems, or what-you-see-is-what-you-get (WYSIWYG) programs, that allow you to design pages on your PC's screen and see exactly how the final printed page will look.

Typesetting Front-Ends

Even professional typesetters complain about the complex coding structures required for the simplest font changes. It's easy to make mistakes in coding, the codes are difficult to proofread, and you can't be sure that all the codes are right until you actually produce the page.

Typesetting front-end programs make these complex codes simpler by arranging them in menus so that you invoke them with just a few keystrokes—but you still can't see exactly what you're getting until you print the pages. The actual printing is done by typesetting machines or laser printers. Products in this category include *Microsoft Word*, *ScenicWriter*, the *Horizon Series*, and *MagnaType*. Most of the word processing programs currently on the market cannot make use of the different typefaces and sizes available through laser printers and typesetters without the intercession of one of those programs.

Microsoft Word

Microsoft Word is the first word processor to offer menus and two-key codes for selecting fonts on laser printers and some typesetting equipment. Many PC owners already use *Microsoft Word* for word processing, but few realize that from the earliest version it has had the built-in ability to select different fonts and point sizes. These options aren't necessary when printing to a daisy wheel character printer, and dot matrix printing has been considered too rough for most uses. Now, low-cost laser printers

PC FACT FILE

***Microsoft Word*, Version 2.0**
Microsoft Corp.
10700 Northrup Way
P.O. Box 97200
Bellevue, WA 98009
(206) 828-8080
List Price: $375
Requires: 256K RAM, two disk drives.
CIRCLE 642 ON READER SERVICE CARD

ScenicWriter
Scenic Computer Systems Corp.
14852 N.E. 31st Circle
Redmond, WA 98052
(206) 885-5500
List Price: $995
CIRCLE 641 ON READER SERVICE CARD

DO-IT
Studio Software
17862-C Fitch
Irvine, CA 99714
(714) 474-0131
List Price: $2,495
Requires: 512K RAM, math coprocessor chip, hard disk.
CIRCLE 640 ON READER SERVICE CARD

Horizon Series Composition Management Software
G.O. Graphics
18 Ray Ave.
Burlington, MA 01803
(800) 237-5588
List Price: $2,450
Requires: 256K RAM, two floppy disks, monochrome monitor, monochrome adapter.
CIRCLE 639 ON READER SERVICE CARD

PagePlanner
PagePlanner Systems
463 Barell Ave.
Carlstadt, NJ 07072
(201) 933-4700
List Price: $3,995
Requires: Recommend 512K RAM and hard disk, but it will run on less memory and two floppy disks.
CIRCLE 638 ON READER SERVICE CARD

MagnaType
Magna Computer Systems Inc.
14724 Ventura Blvd., # 1009
Sherman Oaks, CA 91403
(818) 986-9233
List Price: $8,500
Requires: XT or XT compatible (hard disk drive), 512K RAM.
CIRCLE 637 ON READER SERVICE CARD

Superpage
Bestinfo
33 Chester Pike
Ridley Park, PA 19078
(215) 521-0757
List Price: $7,000
(Additional programs available from Bestinfo: *Typedit*, $500; *Typesat*, $6,995; *Type Processor One*, $4,995)
Requires: 512K RAM, hard disk drive, monochrome monitor, compatible with Hercules Graphics Card; *Type Processor One*, 256K RAM, compatible with Hercules Graphics Card.
CIRCLE 636 ON READER SERVICE CARD

are sparking new interest in *Word*'s more sophisticated features and options.

To accomplish its special effects, *Word* uses a special file format called MSPRINT, which is based on the PostScript typesetting language. MSPRINT will drive some typesetting machines made by Linotype and other high-end output devices such as Apple's LaserWriter printer.

Generally, you use MSPRINT to create a disk file later read by the output device. You can, however, print directly to the LaserWriter through the RS-232 port if you run a simple macro file that prepares the LaserWriter MSPRINT file. Currently, the limited number of fonts available through *Microsoft Word* on the LaserWriter include 10- or 12-point Courier; 8-, 10-, or 12-point Times Roman; and 12-, 18-, and 24-point Helvetica. These different sizes and fonts do not appear on the PC screen, which displays generic, or same-size, fonts regardless of the size you have selected for printing. Furthermore, you have to be careful to add blank lines between lines of larger-than-12-point text. For example, you must insert a blank line above each line of 24-point text since a 24-point character really takes up about two 12-point lines. If you don't add blank lines on the screen, one line of text will overlap the other on the printout.

Linotype makes a program called *LinoWord* that converts *Microsoft Word* files for typesetting on its Linotron 202 typesetter. *Word* works directly with the laser typesetter model 101 and the soon-to-be-released 301.

ScenicWriter

ScenicWriter is a menu-driven editor that uses *WordStar*-like dot commands to format text, insert rules and boxes, and set up multiple columns. You can use it as a standalone text-editing system or to process text created by another word processing program, such as *WordStar* or *Word*. A 40,000-word dictionary comes with the package for checking spelling, but it does not perform automatic hyphenation.

This package's simple graphics capabilities and formatting options make it ideal for in-house publishing departments that produce procedural and technical manuals. When running, it replaces the MS-DOS operating system with its own system commands for file management. The manual includes a list of codes for selecting fonts on Hewlett-Packard's Laserjet, and you can also incorporate PostScript commands for Apple's LaserWriter.

MagnaType

MagnaType, designed to let a PC emulate a typesetting computer terminal, can be used as a standalone package or as an intermediate processor for text files created with other word processors, such as *WordStar* or *MultiMate*. It incorporates five methods for hyphenation and a simple mnemonic system for typesetting codes, including some sophisticated setting specifications not incorporated into other packages in this category. You can set up to 1,500 automatic kern pairs (character-spacing specifications) and four levels of white-space adjustment. You can print in multiple columns (up to 40) and specify column widths in proportional units, picas, or points. Also, a multitasking feature lets you print one file to a typesetter while you hyphenate and justify another file.

MagnaType runs on an XT, an AT, or PC-compatible machines with at least 512K-bytes of RAM and a hard disk. It can

PC Typesetting Software

Manufacturer	Product	Cost	WYSIWYG	Graphics	Hyphenation and justification	Batch processing	Works with other WP packages	Outputs to	Suitable for
Beatinfo	*Superpage*	$7,000	yes	yes	yes; 20K dictionary	yes	yes	most laser printers, some typesettars	books, tabloids
G.O. Graphics	*Horizon Series Composition Management Software*	$2,450	no	no	yes	yes	yes	typesetters	books, tabloids
Magna Computer Systems Inc.	*MagnaType*	$8,500	no	yes	yes	yes	yes	most laser printars, many typesetters	books, eds
Microsoft Corp.	*Microsoft Word*, Version 2.0	$375	yes	no	limited	yes	yes	most laser printars, many typesetters	books, tabloids
PagePianner Systems	*PagePianner*	$3,995	limited	no	yes; 30K dictionary	yes	yes	most typesetters	books, eds
Scenic Computer Systems Corp.	*ScenicWriter*	$995	no	insart PostScript commands	yes	yes	yes	most laser printars, many typesetters	books
Studio Software	*DO-IT*	$2,495	yes	yes	yes	no	yes	most laser printars, many typesattars	ads, brochures

drive laser printers as well as high-end typesetting equipment, such as the Linotype Lintron 202 and Linotronic 300, and the Compugraphic 8400 and 8600. A special LaserWriter version of *MagnaType* that creates PostScript files is available at a lower price than the full typesetting version. Other packages by Magna Computer Systems include *MagnaWord* (the same program as *MagnaType* but without the typesetter drivers) and *MagnaNet* (a network that lets you connect up to eight different devices, including personal computers, printers, modems, and typesetters, through a single file server).

Horizon Series Composition Management Software

The *Horizon Series Composition Management Software* is not the only package of its type on the market, but it is one of the best known. Like *MagnaType*, the *Horizon Series* is designed to turn a PC or compatible into an extra terminal in a typesetting system. The package, which consists of a set of programs and a board comes in two versions, one for Compugraphic machines and one for AM Varityper machines. The Compugraphic version includes a utility that converts a DOS file into a file for the Compugraphic MCS typesetting operating system, and vice versa. This feature enables you to use any PC-compatible word processing program to create a text file with keyed-in typesetting codes and then convert it to an MCS file for typesetting. Then you can add more codes or edits in the MCS version, typeset the file, convert it back to your word processing program to put in yet more edits, and convert it back once again to the MCS file format to be typeset.

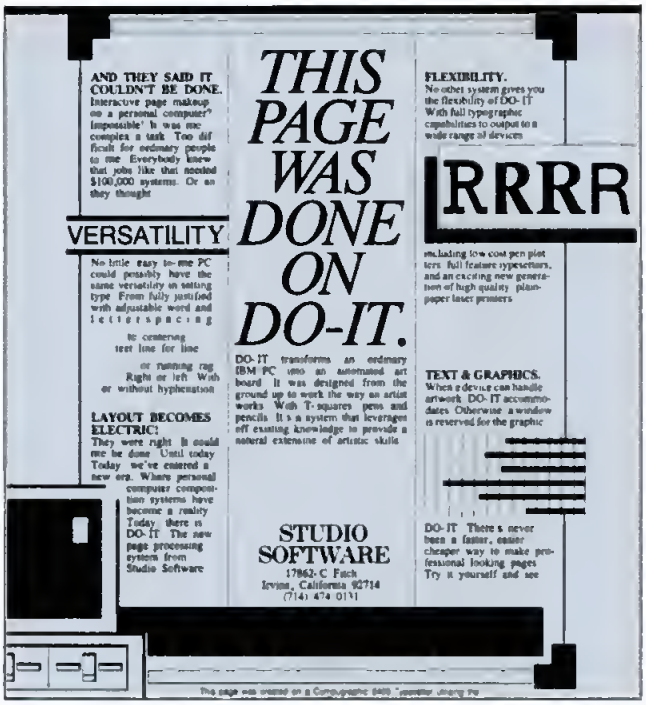
This package would be a good investment for those who already have an MCS or AM Varityper system and want to add a low-cost terminal to their operation (personal computers cost less than the terminal offered through typesetting equipment manufacturers) or in companies where the in-house typesetting facility could take disks directly from personal computer users within the organization. It also solves a common problem for personal computer users who transmit text to most typesetters by allowing the originating PC system to retrieve edits added by a true typesetting terminal at the other end.

The *Horizon Series* supports the Compugraphic 8400 and 8600 and the AM Varityper Comp/Set and Comp/Edit. The package includes communications and disk management programs and lists 16 different fonts in the Triumvirate, Omega, Times, Goudy Oldstyle, Souvenir, and Avant Garde faces.

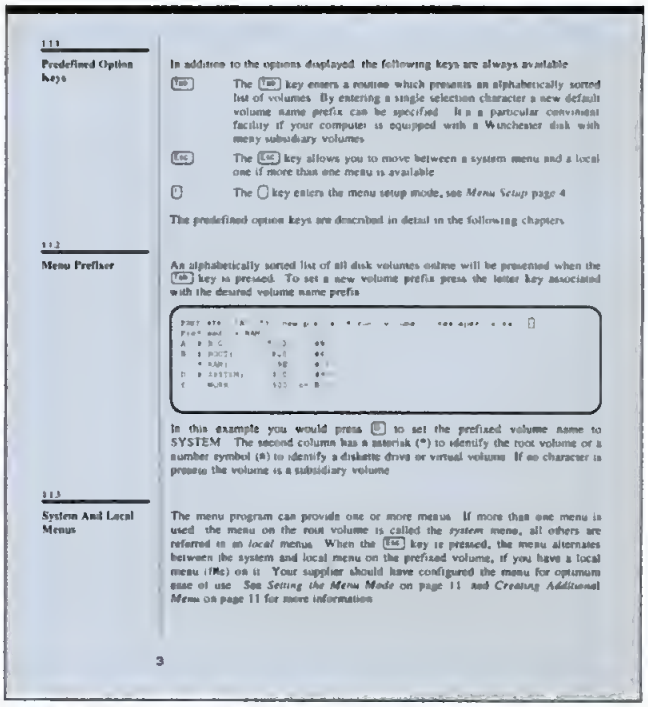
Page-Composition Software

Typesetting front-end programs help bring the coding and writing processes closer together, but the simplicity of their codes means that the range of page designs is rather limited for the broad needs of magazines or annual reports, for instance.

True page-composition systems give the corporate editor or publisher even more creative freedom. These programs will let you compose whole pages of multicolumn text on-screen that allow space for graphics. Typically, you can "pour" text from any word processing program into a column or area of a page and then change the type fonts and add headlines, rules, and boxes. Some of these systems can incorporate scanned graphic images that can be



This page was composed by *DO-IT* and output to a Compugraphic 8400 typesetter.



***ScenicWriter* is a menu-driven editor that uses *WordStar*-like dot commands to format text.**

printed to laser printers (though this advantage is lost on typesetters that cannot interpret graphic input).

One of the significant tradeoffs for full on-screen page composition is slowed system operation. To compensate, larger configurations (more memory and hard-disk storage) are usually recommended to run these systems. They work best on the AT—ideally equipped with the IBM Enhanced Graphics Adapter (EGA)—because the 80286 chip can handle the overhead required by these graphical WYSIWYG systems. Even without graphics, hyphenation and justification are much faster on the AT than on a PC or compatible. For example, Bestinfo's *Superpage* will hyphenate and justify at the rate of 1,500 characters per second on the AT, compared with 500 characters per second on a PC or compatible. This slow speed may discourage publishing departments with a heavy workload and a lot of PCs from investing in some of the better systems.

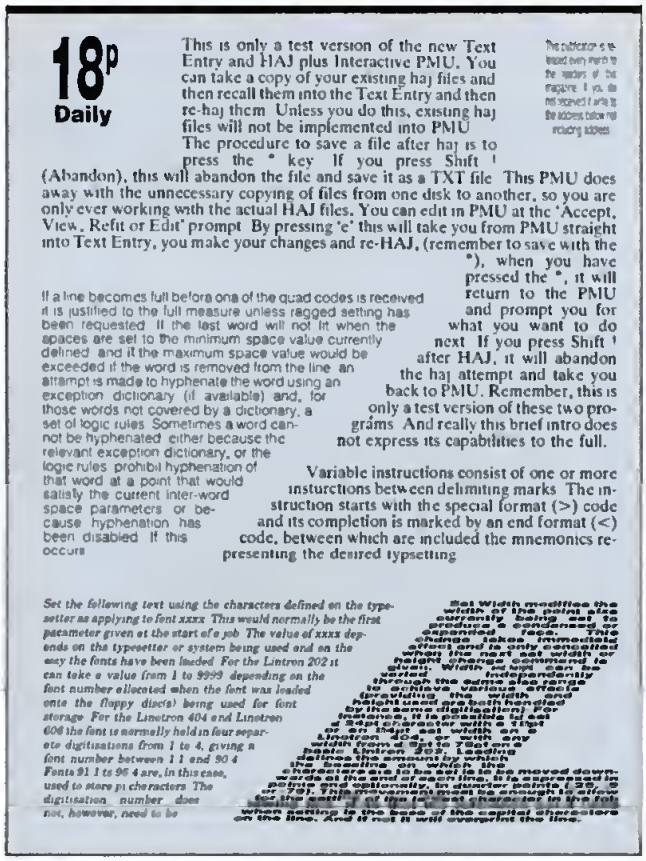
Superpage, *PagePlanner*, and *DO-IT* are three of the most promising products in this category. Not all are true WYSIWYG systems, but at $2,000 to $7,000, they are a natural progression from straight word processing and are challenging the noninteractive WYSIWYG terminals, which some makers sell for $8,000 or more.

PagePlanner

PagePlanner from PagePlanner Systems consists of two menu-driven modules: one for ad layout and one more suited for long documents. Both modules allow full-page layout, including headlines, rules, and boxes; the AdSet program lets you flow text around irregular shapes. A conversion utility translates *WordStar* files into *PagePlanner* format, including embedded formatting commands such as boldface and underscore. Text from other word processing packages can be converted to *PagePlanner*, but the formatting commands are not preserved.

Once you lay out the grid for a page with *PagePlanner*, you can pour text into selected areas. You won't be able to see the actual words on the page layout, but the area into which you poured the text will be filled with a pattern. Information about type size and page dimensions appears on the left side of the screen, and depth of file is given in lines as well as picas, points, or inches. You can toggle to a "view" mode that shows the text: it's a more-or-less WYSIWYG system. PagePlanner Systems also makes a 68000-based monitor that lets you view the made-up page with type in true size and position on the screen—all in a font called Tipton Gothic.

You can use *PagePlanner* to hyphenate and justify in the source text—before pouring it into the full-page grid. But if you find any errors on the printed page, you must



PagePlanner consists of two menu-driven modules: one for ad layout and another for long documents.


Science & Technology

MAKING HOSPITALS LESS HAZARDOUS TO YOUR HEALTH

It's a hypochondriac's nightmare You check into the hospital for one malady and get a brand new—and fatal—one that that scenario is chillingly real Of the 40 million people who enter the hospital each year, 5% acquire infections there And 120,000 of them die.

They are the victims of hospital acquired infections — virulent diseases caused by bacteria, viruses, and even fungi that prey on patients whose ability to fight off disease has been weakened, such as those undergoing cancer treatment. Many of these infections are caused by varieties of streptococcus and staphylococcus bacteria, some of which are developing resistance to antibiotics. But the biggest killers are a group of so-called gram-negative bacteria. They will wells outstart patients more deadly than cobra venom, called endotoxins, that are released when the bacteria are killed by drugs. Half of the patients that get these infections— 80,000 each year—take what James E Hurka, vice president for marketing at Cetus Corp, calls a "48 hour slide to nowhere."

TESTING HORIZONS But the Emeryville (Calif.) biotechnology company and other startups believe they have a way to combat these deadly infections attacking the diseases with monoclonal antibodies instead of antibiotics. In the laboratory, the biotech companies are producing versions of these natural disease fighters that latch onto the toxin molecules. In that way, both the bacteria and any toxin that has been released into the bloodstream are tagged by the antibodies The toxins and bacteria are then swept out of the body as normal waste through the kidneys.

So far, the antibodies have been tested in laboratory animals with encouraging results. They have successfully treated a variety of gram-negative infections including strains of pseudomonas and klebsiella bacteria. The first human clinical tests could begin later this year, by Genetic Systems Corp., a Seattle biotech

Biotech companies are using antibodies to battle deadly bacteria toxins that frequently attack patients in the hospital

company It has completed pre-clinical tests and is preparing to ask the Food & Drug Administration to begin tests on human patients Right behind, however, are Cetus and Xoma Corp. Because the problem of gram-negative infections is so serious, the monoclonal antibody producers predict that their products will quickly win FDA approval.

Cetus is committed to spending $30 million to develop its monoclonal product, and it estimates that the annual market will be at least $300 million. Others believe the market could even briefly be five or six times that big if products are developed that can be used to protect patients from the infections as they enter the hospital, rather than to cure infections after they start. The cost of treating all hospital-acquired infections is estimated to exceed $4 billion annually. "Gram negatives are now the most serious infections the hospitals see today," says Nelson Teng, a Stanford University researcher who is testing the antibodies on animals.

The makers of antibiotics, however, are hard by taking still as the monoclonal antibodies get closer to testing. Glaxo Inc. has just received a go-ahead from the FDA to market an advanced cephalosporin antibiotic that kills gram-negative infections And Squibb Corp. is expecting approval later this year for a new gram-negative specific antibiotic called Leyo Material Exposum.

Those companies insist that antibiotics one curb the problem if they are administered soon after the onset of an infection But they admit there is a role for monoclonal antibodies in treating more serious infections Says Richard Sykes, vice president for research on infections and inflammations at Squibb "Certainly there would be a good use for monoclonals that could mop up the endotoxin in the blood."

ENTRY POINT. Ironically, the most modern research institution—those that deal with the sickest patients—tend to have the highest rates of infection Advanced health care technology "has created many more chronically ill patients to hospitals," says Robert C Nowinski, chairman of Genetic Systems. Those facing the highest risk are patients with weakened immune systems from such factors as traumatic accidents, intensive chemotherapy, or Acquired Immune Deficiency Syndrome (AIDS) Gram negatives have become the major killer of severe burn victims and many cancer patients, especially leukemia sufferers

But other hospitalized patients are also at risk The tubes and catheters for intravenous drug delivery and draining fluids, if left in too long or not kept sterile, provide an entry point for infections. Also, surgery can disrupt bacteria that normally inhabit the body such as those in the gut. If those bacteria get into the wrong place, they can turn into raging infections. That is dangerous to the health and safety of the general public.

MagnaType's multitasking feature lets you print one file to a typesetter while you justify another file.

return to the original text files to do any editing and then rehyphenate and justify and repour the text on the page layout. Testers have measured speeds for hyphenating a file the first time of between 86 and 900 characters per second (depending on text column width), and the program rocketed up to 2,000 characters per second for rehyphenating and justifying text. A newer version of the program promises editing capabilities in makeup mode. In its present form, *PagePlanner* may be a bit more inconvenient to use than it should be for the price, but it does let you produce advertising-quality page comps.

PagePlanner requires 512K bytes of RAM and a graphics card that you can buy bundled with the package if you don't have one already. For obvious reasons, an XT or similar hard disk system is desirable, but it is not strictly necessary. *PagePlanner* will drive an Epson FX-100 or MX-100 printer for drafts as well as other typesetting equipment, such as the Linotype Linotron 101 and 202, the Compugraphic 8400 and 8600, the AM Varityper Comp/Set and Comp/Edit, the Autologic APS-5, the LaserComp, the Compugraphic EditWriter, and the Linotype CRTronic 150, 200, and 300. The company says *PagePlanner* will support laser printers in an upcoming version.

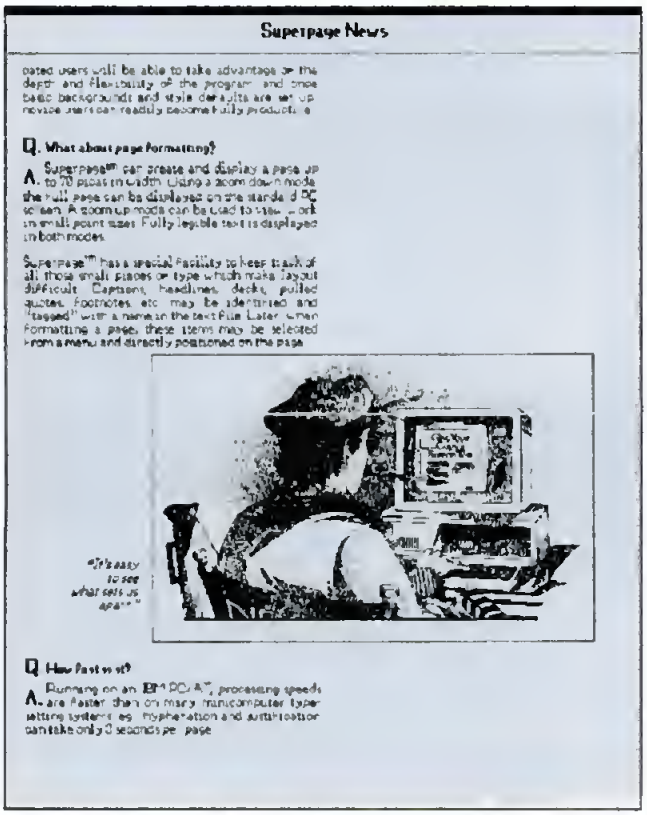
Originating in England, the program comes with an interesting copy-protection scheme: a small piece of hardware, called a "dongle," that plugs into the parallel port and must be installed in order to run the program. Over 3,000 copies of *PagePlanner* have been sold worldwide (including versions for the British Cifer and other microcomputers running under CP/M or MS-DOS). *PagePlanner* is currently marketed by Linotype and Locker Typesetting Equipment, and this support should help secure its place in the PC market for page composition systems. For an additional $4,000, it comes packaged with an IBM-compatible 640K-byte ITT PC equipped with a 10-megabyte hard disk.

DO-IT

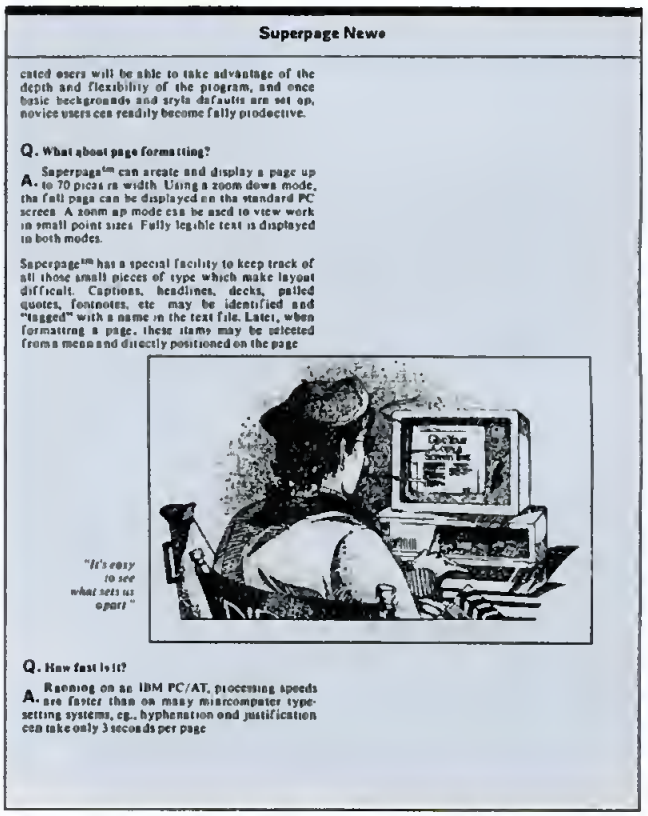
DO-IT has the most interactive interface of all the systems reviewed here, including the use of a mouse and icons in an absolutely WYSIWYG environment. It makes your PC (or compatible) screen resemble a Macintosh with dark characters and graphics on a light background. You type special codes or macros, such as "heading 1" or "body copy 1", into any text file, then set up attributes such as font and line width for each code in a *DO-IT* table. Attributes can be typed in or selected from menus.

You can view the whole page on the screen or zoom in to see the text and graphics layout in detail. The on-screen view can be improved with the IBM Enhanced Graphics Adapter. *DO-IT* is best suited for ads and brochures. It is currently too slow for efficient magazine or book production if you expect a lot of editing changes.

DO-IT drives the Apple LaserWriter, HP Laserjet, Imogen 800/3, QMS Lasergrafix Series, Xerox 2700, and other laser



Bestinfo's *Superpage* allows you to output to a dot matrix printer for proofreading purposes.



***Superpage* can accept digitized art. However, only a few laser printers can output scanned images.**

THE PREMIER PAGE-COMPOSITION LANGUAGE

PostScript, the language used by Apple's LaserWriter, may become the industry standard because it's flexible and has logical commands.

PostScript is on its way to becoming the standard language for page-composition systems. This interpreted, English-like programming language from Adobe Systems of Palo Alto, California, is used to describe text and graphic images to typesetting services, laser printers, and other high-quality printers. PostScript is the language used by Apple's LaserWriter printer and is being incorporated into other systems such as several new typesetting output devices from Linotype Co. Other manufacturers, including QMS Inc. and IMAGEN Inc., are scheduled to introduce PostScript-compatible machines in late 1985. As yet, the only programs that support PostScript are *Microsoft Word* and Scenic Computer Systems' *ScenicWriter*, but many other developers claim to be working with the language.

PostScript gives you limitless flexibility in defining the shape, size, rotation, and position of text, graphics, and scanned images to be output on a printed page. Instead of working from completed bit maps of each item to be printed, PostScript stores a mathematical description of the character's (or shape's) outline and, at printing time, converts the outline into the appropriate individual character bit map. In this way, PostScript offers infinite variation on any given typeface without requiring massive amounts of memory. Since PostScript treats text as a subset of graphics, graphics operations such as rotate, translate, and fill can be applied to text as well.

PostScript definitions have already been created for some of International Typeface Corp.'s popular typefaces as well as the Mergenthaler, Linotype, Stemple, and Haas typefaces from Linotype. Programmers can modify any typeface that comes with PostScript or create their own fonts. New font shapes are stored in a font dictionary for later use.

One factor that will help make PostScript the industry standard is its logical and meaningful commands. For example, to print a line of text in the 18-point Helvetica font starting at a position to the right of and 3 inches up from the bottom left corner of the page, you would type the following commands:

```
/simplefont /Helvetica
findfont 18 scalefont def
216 216 moveto (PC
Magazine) show showpage
```

These commands define a name for the 18-point Helvetica font; next time, you can invoke that font by typing "simplefont". The code moves the start point of the text display to the correct position on the screen (PostScript follows the typesetting convention of 72 points to the inch); it indicates the text, "*PC Magazine*," is to appear on the page; and then it forces a page display, which also clears the memory in preparation for the next page description.

PostScript also offers a full set of commands for describing line graphics and halftones. You can draw lines and arcs and fill any shape with a pattern or a halftone screen. PostScript can rotate and distort any graphic image and can handle scanned graphics and vector-oriented (plotter) graphics.

PostScript commands are considered straightforward and easy to learn, and typesetters and graphic artists will not have to wade through technical training in order to enjoy its benefits. Rather, PostScript is the "invisible" miracle behind the recent flourish of easy-to-use, on-screen page-composition systems being released for the PC.

—Diane Burns and S. Venit

printers. It also drives five Linotype models, the Alphatype CRS, the AM Varityper 6400, the Autologic APS-5 and Micro-5, and the Compugraphic 8400 and 8600.

Studio Software is a value-added retailer for Apple's LaserWriter: It sells the LaserWriter bundled with *DO-IT* for under $10,000, particularly to in-house publishing departments that want to step up from standard word processor output. *DO-IT* is expected to run on the new typesetters from Linotype that can read PostScript files.

Superpage

Bestinfo make the most well-known, expensive, and complete solution for corporate and professional publishing. It offers a line of four products that run distinct tasks in a multiuser environment: *Typedit*, *Typesat*, *Type Processor One*, and *Superpage*. *Typedit* is a text editor for networked systems that includes a job tracking/file management facility. *Typesat* has all the features of *Typedit* and adds hyphenation and justification in a WYSIWYG mode; it's an ideal program for editors to use for reviewing, modifying, and editing galleys in preparation for page composition. You can use *Typesat* as a standalone or in conjunction with *Superpage*.

Type Processor One is ideal for forms, display ads, and brochures. The program lets you draw an outline and then pour text into it. Kerning, tabs, and leading in ½-point increments are done in a separate module that shows true size and position. You can draw ruled lines for forms production.

Superpage, driven with *1-2-3*-type menus, is similar to *Type Processor One* but has additional features geared for production of books and other large documents. *Superpage* lets you set up headers and footers, as well as left and right pages. You can flow text from a word processing package into outlined areas on the page. You can create page formats on-screen and store them for reuse later. In *Superpage*, you can edit text in paste-up mode as well as add rules and boxes. *Superpage* can accept scanned images, but these can be output to certain laser printers only, and only to the new Linotype PostScript typesetters, the recently released 101 and the not-yet-released 301.

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PAGE COMPOSITION

With *Superpage*, you have the option of working on a 10-inch by 7-inch monitor, which is available from Bestinfo. *Superpage* drives the IBM Graphics Printer and the FX-80 (or compatible) for preview drafts. It supports popular laser printers, including the H-P Laserjet, QMS printers, Imagen laser printers, and the Xerox 2700 and desktop printer. It drives slave typesetters from Linotype, Compugraphic, and Autologic and direct-entry typesetters from AM Varityper, Compugraphic, and Itek. *Superpage* also generates code for other front-end systems, including Atex, Penta, CCI, AKI, and Quadex.

Typesetting and page composition programs are making page-design capabilities that formerly required $100,000 systems now available for under $5,000 to any company that already has one or more personal computers. The programs described here represent just the first wave, but they are likely to have far-reaching effects on the appearance of business documents in the future.

Corporate publishing departments that have been sending their word processing files to typesetters for coding can save typesetting costs by bringing all design, coding, and editing functions in-house. They can also print files to a dot matrix or laser printer as galleys for proofreading and format checking before they send them to a typesetter for high-quality production on expensive (50-cents-per-foot) photographic paper.

The ability to merge text and graphics in one file—to produce a completely illustrated document without a knife or glue—will usher in a new era in "information retrieval." If one picture can replace a thousand words, you can expect this graphics revolution to make speed reading obsolete as more and more illustrated documents offer information at a glance. One thing is certain: Once you have printed a report with large, bold Times Roman headings on a laser printer or telecommunicated text to a typesetter and received beautifully typeset galleys in return, it is hard to go back to straight word-processed text. ■

Diane Burns and S. Venit are IBM PC power users as well as Macintosh afficionados who contribute regularly to PC Magazine.

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Calc Result

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Word Result

High capacity word processor. Unlimited document length. Built in database that can be run separately or together with the word processing for mailmerge etc. Automatic save of document. Macros. Built in help functions. Direct editing on the screen. Supports more than 100 printers incl laser printers. Abbreviation list. Alphabetically sorted directory. Extensive document information that can be used for all documents. Passwords can be used. Header/footnotes for each page. ASCII-files and DIF-files.

Word Result and Calc Result integrated

When you run the Result Programs integrated you have immediate access to all four modules; spreadsheet, word processor, database and graphics. You can move calculations or graphics to the word processor and print it out in your document. You can split the screen and run calculations on top and word processing in the bottom. Use the database and word processing for mailings or print your graphic pictures direct in the report you are writing.
The Result Programs are very easy to master thanks to the logical command structure. You have full word commands on the screen at all times.

The Result Programs have the commands and helpfunctions in 10 languages. You can switch between English and for example Spanish commands in less than a minute. The languages included are English, French, Spanish, German, Italian, Dutch, Swedish, Finnish, Norwegian, Danish.

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- 320K RAM (minimum)
- Mouse (Microsoft compatible)
- Two disk drives (one double-sided)
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Forms-design software helps you organize information by creating flowcharts, schedules, and forms for gathering data. The four packages reviewed here each take a different approach to the design process.

When Good Form Matters

You've followed the reviews of business presentation graphics products and found one that fits the needs of your office. You've conquered the heights of column charts and know how to slice a pie chart every which way. But how about those tree-shaped organization charts, and the formatted input forms used for data gathering? Can this design process be automated as well?

A number of companies nationwide have responded to this question by marketing diagramming, or forms-design, software. Where business presentation graphics packages render graphic representations of numeric data, such as pie and bar charts, diagramming software simply depicts information graphically in reporting hierarchies and flowcharts, schedules, and forms.

This category isn't as well defined as presentation graphics, and the four packages reviewed here each have a different emphasis. *MonoGrafx* makes the most of a monochrome display adapter and an Epson printer, while the *Computerized Presentation System (CPS)* uses a mouse and vector-based graphics. *FormTool* focuses on the creation of forms, and *Diagram-Master* boasts predesigned layouts for the major chart types. The programs each have different types of user interfaces and varied output devices according to their purposes.

These tools give your forms and diagrams a graphic flair and allow you to modify your designs as often as necessary. **—Stephanie Stallings**

MONOGRAFX

Analytics International Inc. calls *MonoGrafx* an image processor that lets you create graphics and text without a graphics board. This means that *MonoGrafx* allows you to create and label any diagram that can be constructed manually from horizontal and vertical lines and boxes, such as flowcharts, organizational charts, calendars, and forms. Moreover, busy users will find that it takes a minimal amount of time to configure and learn the program.

To install *MonoGrafx* you simply copy DOS onto your *MonoGrafx* disk. If you don't have the standard IBM PC system, including an IBM monochrome display and adapter and IBM printer, you call up the HARDWARE file at the A> prompt and follow the simple instructions on your screen to configure the program to your system. Although the program requires only a monochrome monitor, it works perfectly fine in black and white on a color monitor. *MonoGrafx* is compatible with 59 printers, including several models from Star, Printronix, Panasonic, NEC, IDS, IBM, Diablo, Dataproducts, Citizen, C. Itoh, Okidata, and Epson.

MonoGrafx has two tutorials, one on-screen and one in the manual. Both provide a thorough introduction to the package, teaching the user basic cursor movements, how to use the menus, how to use function keys for creating lines and symbols, and how to print and save a file. Once you have completed this five-part tutorial you'll be able to swim effortlessly in the program.

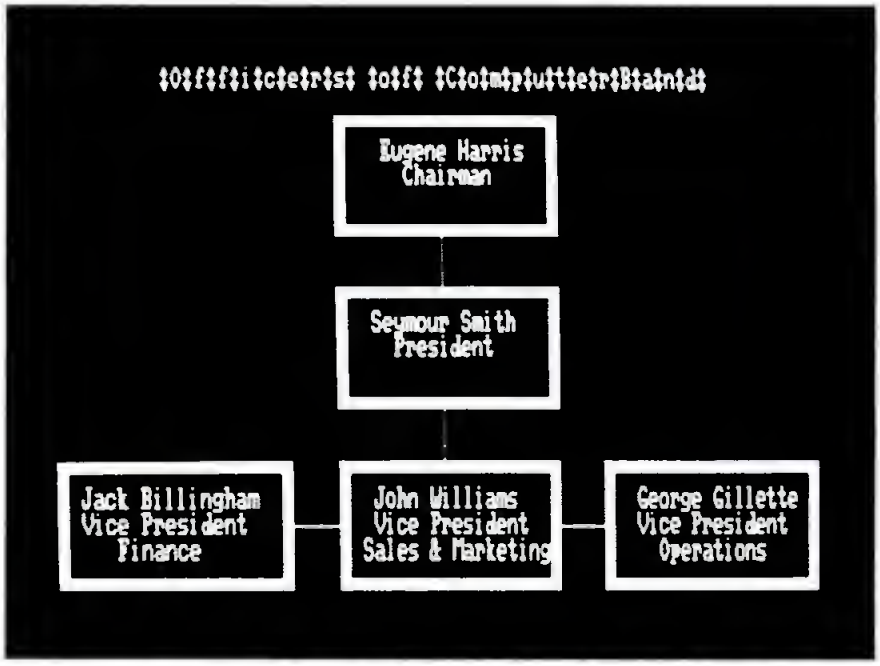
The well-designed manual is meant to be a reference, covering each program function and listing the function names in the margins to simplify searches. The doc-

umentation includes a three-page index, and Appendix A gives a quick summary of all the commands.

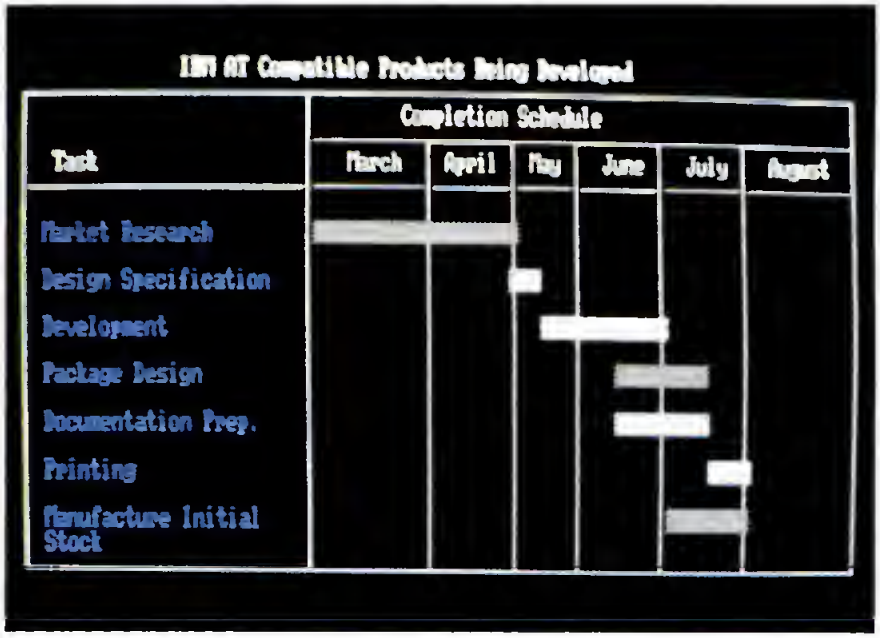
The program is easy to use even without the tutorial. The main menu remains at the top of your screen at all times. You access seven pop-up submenus by hitting the Esc or slash (/) keys. Once in a submenu, the program provides step-by-step instructions at the bottom of your screen, prompting you through each menu operation. The range menu allows you to create rectangles and patterns, while Box commands are for drawing rectangles with thick, thin, dotted, or double-line borders. The Ext commands permit enlarging, stretching, underlining, and boldfacing, and Edit allows you to undo a command or create a backup file. File includes all file maintenance operations. Print controls all printing operations including condensed type and multiple copies. Quit requires you to confirm your intention to leave the program.

The function keys create lines and corners. Hitting Alt plus the function keys lets you draw arrows, triangles, and diamonds, which are about the size of a letter in a block of text. Ctrl-F1 calls up the definitions for the function keys. In the "text insert" mode, the function keys allow you to specify the margins of your text.

MonoGrafx will not automatically create charts from numeric data, nor does it permit you to draw pie charts or curved or diagonal lines. Still, it is a useful and easy-to-use tool for creating simple business graphics. And for $69.95, it might just hit the spot for your business presentation needs.—**Cheryl Goldberg**



Organization Chart: The boxes in this organization chart were drawn with the Thickframe option on the range menu. After you create the first frame and choose the Clip option on the range menu to save the shape, you can paste the frame down again and again by using the Paste command of the range menu. You type text directly into boxes; in this example, the Boldface option was chosen to highlight the letters. The large type for the heading was created with the Enlarge command in the text menu. The characters between the enlarged letters appear in screen shots because *MonoGrafx* works on computers without graphics boards and thus cannot display enlarged characters on the screen.

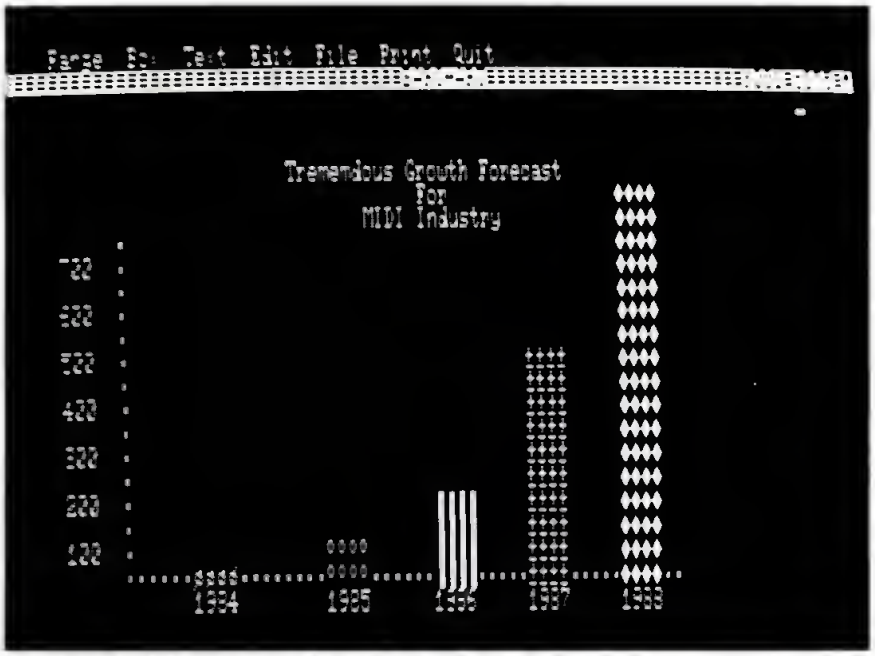


Gantt Chart: The separation lines on this Gantt chart were created with function key commands. When you draw lines with *MonoGrafx*, the program makes certain assumptions about the direction your line will go next. To know what those assumptions are, make sure you check the direction of the cursor indicated on the "information bar"; otherwise your lines will zip around the page in unintended directions. In addition to creating Gantt charts, you can use the lines to create your own forms. The text menu's Underline command and the range menu's Fill command were used to create underlines and bars.

PC FACT FILE

***MonoGrafx*, Version 2.1**
Analytics International Inc.
1365 Massachusetts Ave.
Arlington, MA 02174
(617) 641-0400
List Price: $69.95
Requires: 256K RAM, one disk drive, DOS 2.0 or later.
Diagram Types: Organization charts, forms, flowcharts, schematic diagrams, calendars, Gantt and bar charts
Accepts Imported Data? ASCII format
Output Devices: 60 printers

CIRCLE 634 ON READER SERVICE CARD



Bar Chart: *MonoGrafx* **provides 19 different fills. This bar chart illustrates 5 of them. The spotted axis was created by invoking the Dotframe command on the range menu, then deleting the unnecessary two sides of the box. In each of these three figures, the file menu's ViewScreen command was used to get a version of the drawing on the screen that was unobstructed by the information line. This is a useful feature for those desiring screen shots.**

calls slides—print them, and organize them into slideshows.

CPS is closest in concept to "paint" programs, and its extensive features and intelligent organization make it clear that it is not a toy. *CPS* is not exactly a graphics program—since it cannot accept numerical data or convert it into graphs—but it includes several features that aid in the construction of very accurate diagrams and charts.

To use *CPS*, you select from a menu the type of object you want to draw, such as a line, circle, box, oval—and with a few clicks of the mouse the object appears on the screen. Options like a "magnifying glass," a long cursor, coordinate position display, and scaling aid sizing and placement.

CPS includes 11 fonts in six sizes and a font-editor to help you make your own. You can either type text from the keyboard or select it with the mouse one letter at a time.

Unlike most paint programs, *CPS* stores vector descriptions of each individual object, rather than the dot pattern for

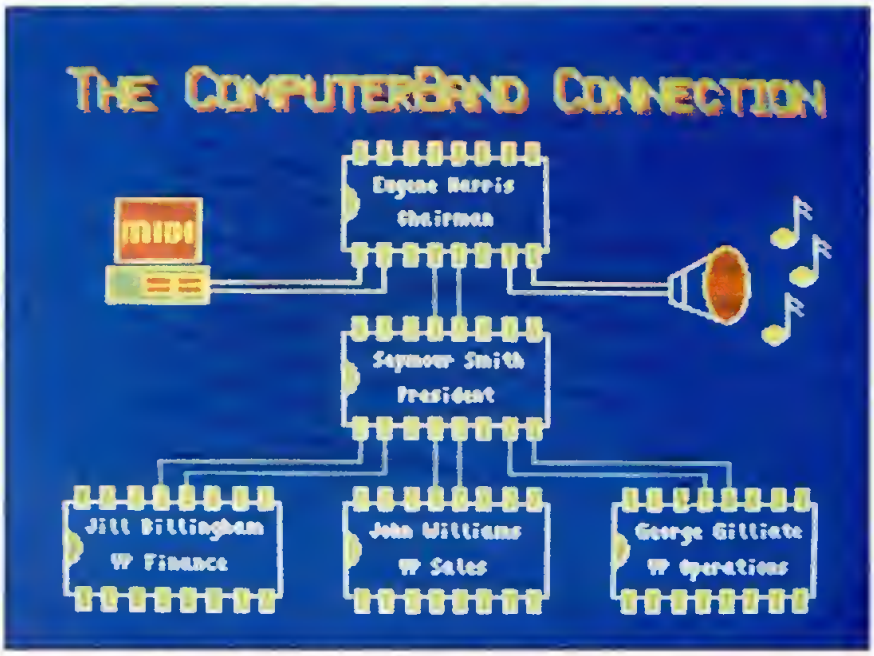
COMPUTERIZED PRESENTATION SYSTEM

The *Computerized Presentation System (CPS)* is a sophisticated drawing and diagramming package that was programmed by Grafsoft Corp. and is marketed by Practical Peripherals Inc. *CPS* draws images on the screen from simple objects and text. You can edit the images—or which *CPS*

PC FACT FILE

Computerized Presentation System
Practical Peripherals Inc.
31304 Via Colinas
Westlake Village, CA 91362
(818) 991-8200
List Price: $195; high-resolution option for Tecmar, $35
Requires: 512K RAM, two disk drives, DOS 2.0 or later, IBM or Tecmar Graphics Master color/graphics adapter and display; hard disk and mouse recommended.
Diagram Types: All types
Accepts Imported Data? No
Output Devices: IBM, Epson, and other B&W printers; IBM, IDS, Transtar, and other color printers; Hewlett-Packard and other plotters

CIRCLE 633 ON READER SERVICE CARD



Organization Chart: It is easy to manipulate *CPS*'**s geometric shapes. Author Charles Petzold envisioned ComputerBand's organization chart to be as tightly structured as computer chips on a circuit board. He drew a chip using a rectangle and notched it with a filled arc. He then used a rectangle to represent a pin, copied it seven times, aligned and evenly spaced the pins via a Menu option, and copied them to the opposite side of the chip. Defining that first chip as a symbol, he copied it four times and moved each into position. The drop-shadow on the heading is a simple** *CPS* **menu selection.**

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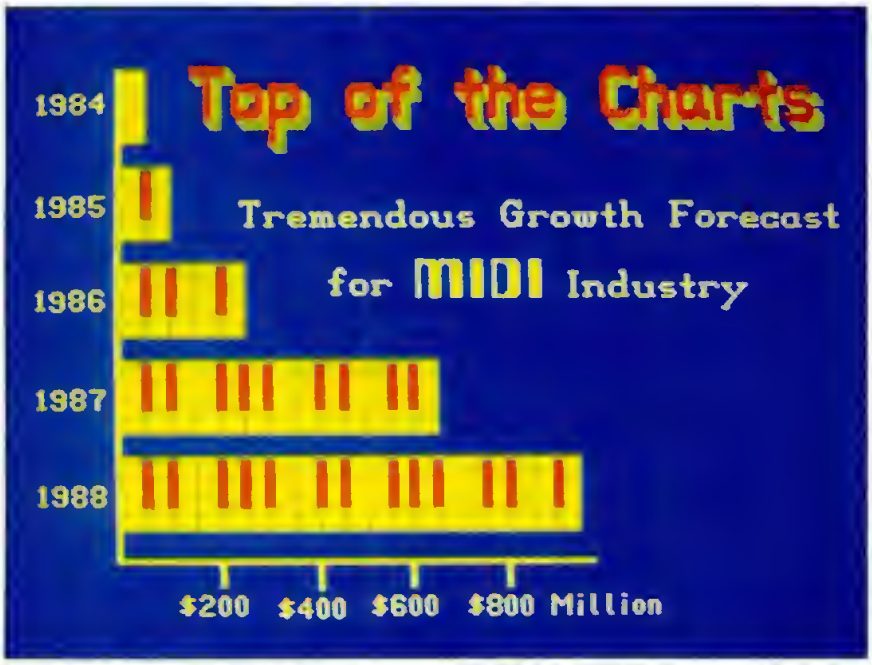
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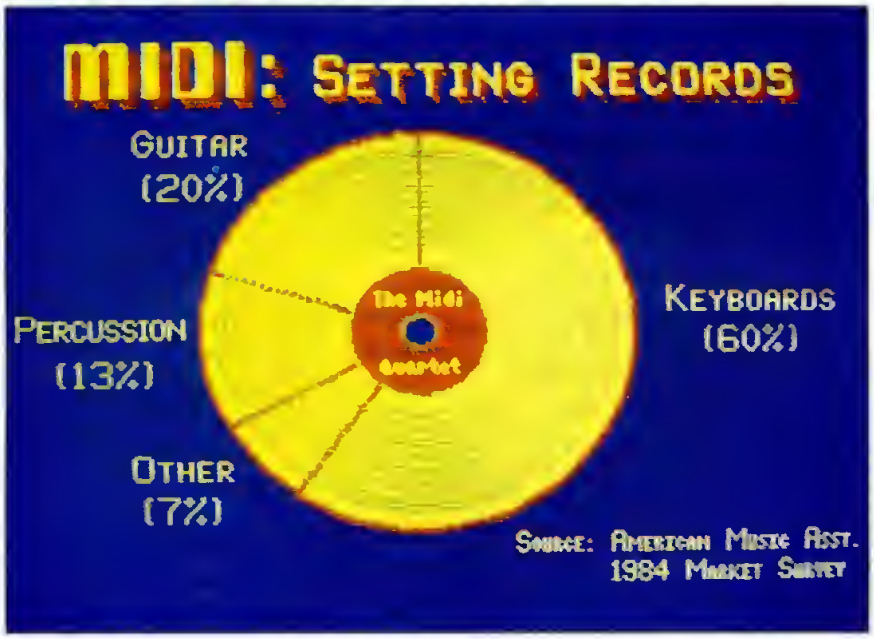
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Bar Graph: Since *CPS* does not import or accept numerical data, the user must choose a method to represent the necessary information. In this bar graph, one "ivory" piano key is equal to $50 million of sales. Here, the user successfully copied one rectangular key six times, drew an "ebony" key, and copied that four times. Once the octave was complete, the user defined it as a symbol and copied it to lengthen the keyboard. The *CPS* alignment and spacing option enabled him to make sufficient room for the axes and text. The final result is an accurate and clear graph.



Pie Chart: With *CPS* you select from a menu the type of object you want to drew. Here, the user drew pie wedges and then used the scaling option to display the angle of the wedge. Multiplying each percentage by 360 degrees allowed the user to accurately draw each piece of the pie. The *CPS* scaling option also displays the coordinates of the cursor and the radius of a circle, so that it was easy to make the grooves of the simulated record concentric and evenly spaced. The record label hides the wedge lines in the center. The accompanying type was chosen from *CPS*'s 11 type fonts in six sizes. The program also includes a font editor that helps you to create your own font.

the entire screen, resulting in very small data files. For instance, the file sizes of the three accompanying illustrations ranged from 1,024 to 3,584 bytes.

A drawback of vector organization is that it limits free-hand drawing, but an advantage is that it makes it very easy to edit the slide on an object-by-object basis. The editing facilities include moving, copying, deleting, rotating, and sizing, as well as changing colors, line widths, and fonts. Editing an object does not disturb other objects in the foreground or background.

When you need to edit a group of objects as one, you can select the objects with a box or by pointing. You can also define a collection of objects as a named symbol and save it on disk for other slides.

> Computerized Presentation System is closest in concept to "paint" programs.

Once you've created a series of slides, you'll want to organize them into slideshows. Again, this is done entirely with the menus and mouse. *CPS* displays lists of slide files on the disk, and you specify which slides you want included. Changing the order of presentation is also a simple mouse maneuver.

When each slide is displayed in the slideshow, *CPS* draws the objects on the screen in the same order that you created them. You can use the "sequenzer" menu—again entirely mouse-driven—to reorder the sequence of objects within a slide and insert pauses for dramatic effects, such as between bars on a graph showing consecutive years' earnings.

Although you can print out the slides on a variety of black-and-white or color printers and plotters, a more exciting prospect is a darkened conference room equipped with a PC and a projection TV system.

CPS has therapeutic as well as practical value. Its easygoing interface and gentle, forgiving manner make the program fun and relaxing, reducing business stress while inspiring a strategic creativity. *CPS* has given me some of the most enjoyable times I have spent with a computer.

—Charles Petzold

FORMTOOL

FormTool offers a low-cost, computerized solution to creating the kinds of forms that people fill in manually, such as questionnaires and timesheets. On typical forms, horizontal and vertical lines demarcate areas and printed text directs the reader. *FormTool* provides a few automatic forms-design features, and it offers all kinds of peripheral assistance, such as windows, a database, and context-sensitive help. But underneath all these extras, *FormTool* has one purpose—to draw lines.

FormTool's automatic features include commands to draw continuous lines with a single key-press rather than through holding down a key while the cursor travels across the screen. Other commands will convert the lines or text to boldface and will make neat corners where lines intersect. The tab-setting feature can help you position lines or text, and the grid feature is an easy way to lay down a grid of any proportions. You can choose among four standard form sizes of 8½ by 11, 11 by 8½, legal, or computer, or you can customize a form size up to a maximum of 132 columns by 80 lines.

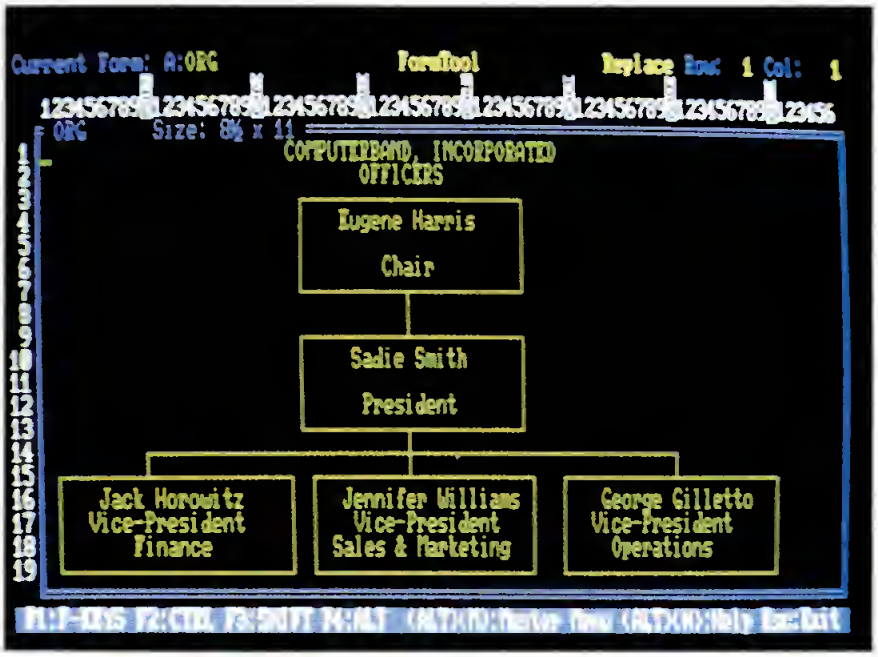
The screen layout is designed to keep you well briefed. A status line at the top of the screen displays the names of the current form and the active command as well as row and column indicators. The command line along the bottom border exhibits prompts and messages.

FormTool uses every combination of the function keys with the Ctrl, Shift, and Alt keys, as well as Alt in combination with letters, and Ctrl matched with other

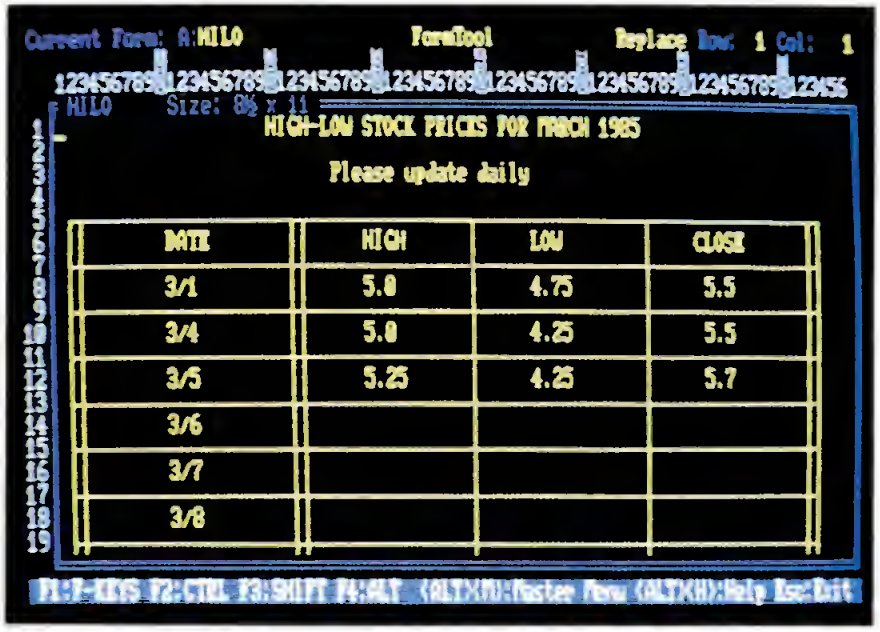
PC FACT FILE

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Miami Beach, FL 33139
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Requires: 256K RAM,
at least one disk drive, DOS 2.0.
Diagram Types: Forms,
organization charts
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ASCII files
Output Devices: IBM
or compatible dot matrix printer, Hewlett-Packard Laserjet, and other printers

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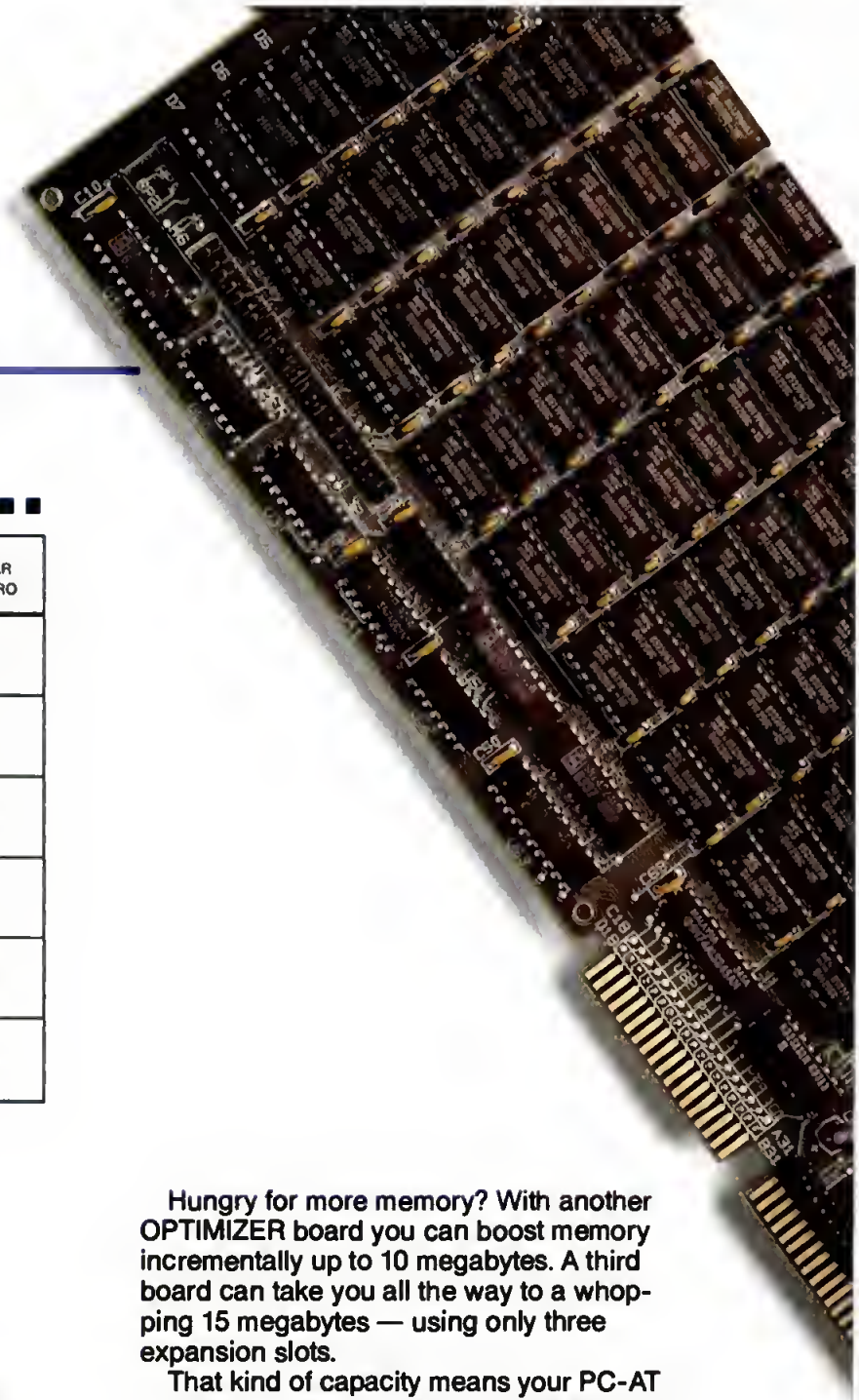


Organization Chart: *FormTool* can create organization charts, even though its primary application is such simple forms as questionnaires and timesheets. In this chart, drawing the first box required the most care; you must remember to hit the Return key at each corner in order to avoid creating extra lines. Once the first box was replicated, typing the text in was simple. An alternative approach is to create the layout of the organizational chart in one file, then copy it to another file to add to the text. This method enables you to use a single layout to create multiple forms.



High-Low Stock Table: *FormTool* lends itself to the drawing of forms that will later be filled in by hand or on the typewriter. You can create the layout in this example using the horizontal and vertical line commands, which draw a line to the next perpendicular one. If you want all the boxes to be the same size—as they are here—you can use the Grid command, which will prompt you for the width and number of columns and rows. In *FormTool*, some tasks take so many steps to implement that you may wonder whether the task would be better carried out by hand.

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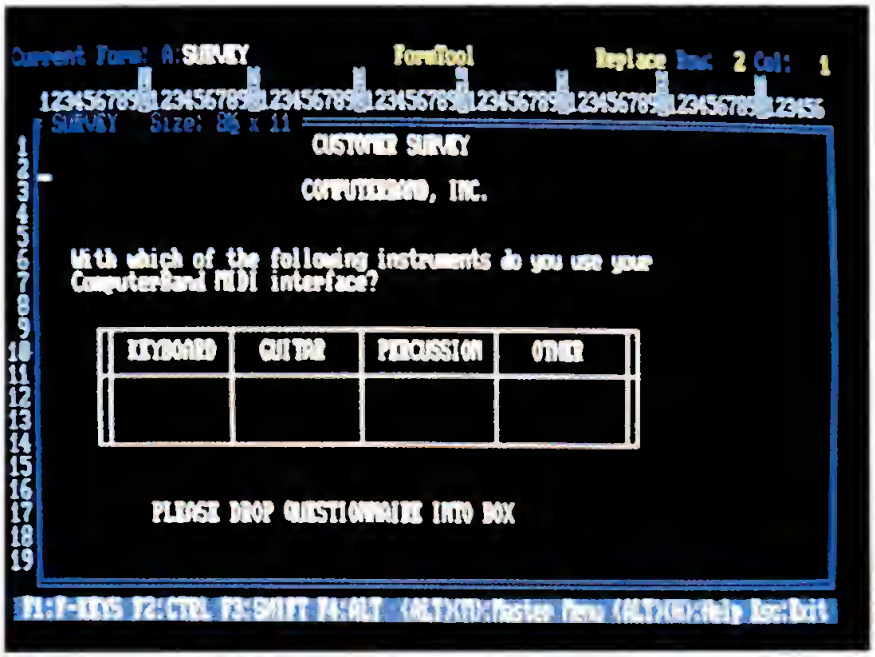
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Survey1: *FormTool* can boldface both text and lines. The selected areas do not appear as boldfaced text on the screen, but a Show Boldface command displays them in reverse video. If you have several surveys named Survey1, Survey2, Survey3, and so on, *FormTool*'s database will list all of them for you when you type in "Survey." You can also assign category names and then use them to select forms; for example, the organization chart and Survey1 could be put in the office category, while the High-Low table might be linked to the sales category.

nonnumeric keys. This adds up to a lot of commands to remember, especially since there are separate ones for each permutation of a situation. For instance, there are four distinct key combinations to move a window to the top, bottom, left, or right of the screen.

This type of command structure tends to turn tasks into multistep procedures. For instance, if you want to reposition a block of text, you must first mark the block by placing the cursor on it and pressing Shift-F2, then move the block by relocating the cursor to the new position and pressing Alt-P. It's often easier to reposition the cursor and retype the text.

In addition to the commands that alter the form, *FormTool* includes windowing and database functions. You can change the size of the window and move the window around the screen. You can also layer the active windows, but you cannot retrieve any but the current layer. The database functions replicate several DOS features. You can retrieve a list of form names by entering a common letter pattern, and you can delete a form. You can group forms into categories, then retrieve them with the category name.

Some of *FormTool*'s responses need further explanation. On starting a new form, a message sometimes appears saying that there is insufficient space. This is bewildering until you remember to call up the context-sensitive help message, which explains that there are too many active forms. In another situation, the command to quit the current form often boots the user out of *FormTool* altogether. Trial and error revealed that this occurs whenever you are down to just one active form.

> FormTool includes windowing and database functions. You can change the size of a window and move it around the screen, and you can also layer the active windows.

Printing your forms is a simple menu-driven procedure. If your printer is not an IBM or a 100-percent compatible dot matrix, make sure that BLOC supplies a device driver for it, or all those demarcating lines will print as Ds and 3s.

The *FormTool* press material describes this software as so easy to use that the installation and start-up procedures are printed on the back of the floppy holder, rather than in the documentation. As a matter of fact, there is no accompanying manual, though you can print out the documentation if you decide you miss the feel of paper in your hands.

At $75, *FormTool* is certainly a low-cost solution, but that doesn't make it a penny-wise one. There is still so much about this product that is not automatic, such as the drawing of boxes and the placement of text. It doesn't include fonts, nor does it use the extended character set to create interesting designs or borders. If you need to design one or two forms, you can do it just as easily by hand. For larger quantities, a more sophisticated software tool will be well worth the higher price.

—Stephanie Stallings

DIAGRAM-MASTER

Diagram-Master is a highly sophisticated but relatively friendly business diagramming program that produces organization charts, Gantt charts, and a variety of free-form images. It is part of the Decision Resources series of business graphics software that also includes *Chart-Master*, which produces data-related graphics such as bar and pie charts (see *PC Magazine*, Volume 4 Number 12), and *Sign-Master*, which creates signs and tables.

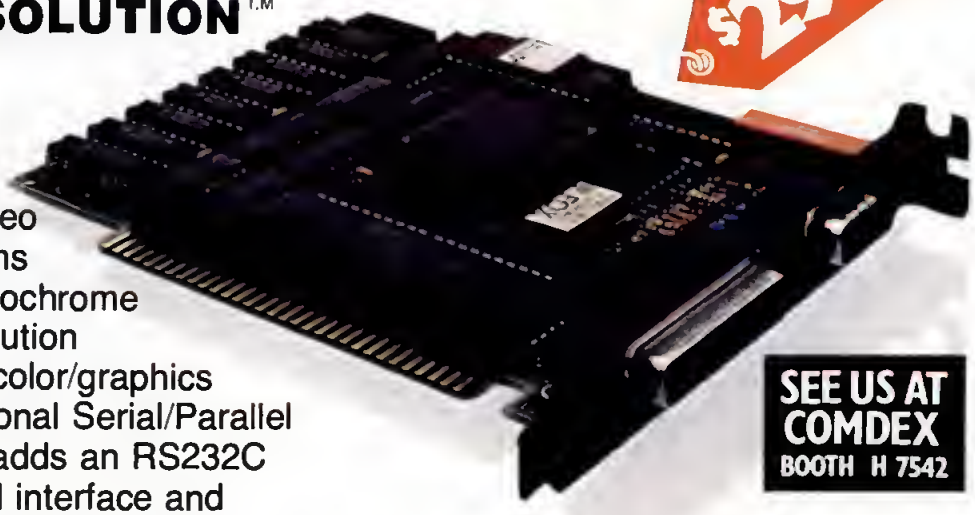
The product consists of five individual disks, each containing a separate program "module": main program disk, drawing board, organization chart, Gantt chart, and a large library of presaved images and formats. Users find their way through the somewhat complex maze of programs and utilities by following an explicit and efficient series of menus.

When you first boot up the program, you are automatically shunted into a hardware configuration file, which covers all of the various hardware and software permutations needed, such as color capabili-

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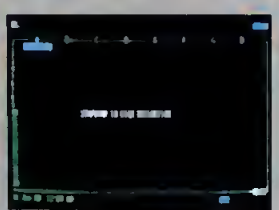
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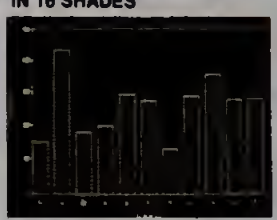
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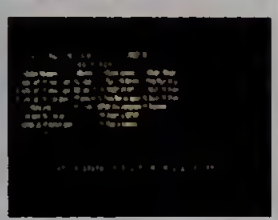
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FORMS-DESIGN SOFTWARE



Organization Chart: This relatively simple image was produced with only *Diagram-Master*'s basic Organization Chart module. The program prompts you for the two lines of title (along with the text font and size), the number of reporting levels, whether you wish to include an unboxed list (for staff members not in the chart), the number of boxes on each level and which boxes they in turn report to, and the text for each box. Once you complete the chart, you can at any time alter the text, add or delete boxes, or include more complex graphics using the Drawing Board module. The musical note logo comes from a test font called "symbol," which supplies an "alphabet" of arrows, shapes, and simple graphics that you can add to an image in the same way that you add text.

ty, printer and/or plotter, screen size, and whether you want the on-screen type to be kept in proportion to the graphic or automatically adjusted to be readable if the type size is too small. Once the configuration is complete, you are then introduced to the program's main menu and can either call up a previously stored graphic, create a new one, or call up one of the program's three main modules.

Diagram-Master's Drawing Board module gives users a free-form graphics program. The first menu lists the available functions, such as adding, editing, or deleting a shape or text. After you make your choice, you select text or a specific shape: arc, circle, square, or a predrawn figure from the library.

Text is available in all of *Diagram-Master*'s modules. Users can decide among seven fonts sized from 1 to 16 points, italicizing, justification, underlining, and color (if they have a color plotter). There are also eight on-screen colors available (four per graph) which, while limited, are more than adequate to produce a reasonably impressive display.

Both the Organization Chart and Gantt Chart modules take users through an orchestrated series of steps to create quite professional-looking charts. The former offers choices of titles and subtitles, organizational levels and connections, typefaces and staff listings, while the latter prompts for titles, time divisions, labels, and bar attributes. Once you draw the basic chart, you can enhance it further by using the Drawing Board module, but you will not be able to take your chart back to its original module for further editing.

> Diagram-Master is a sophisticated but friendly diagramming program that produces a variety of charts and free-form images.

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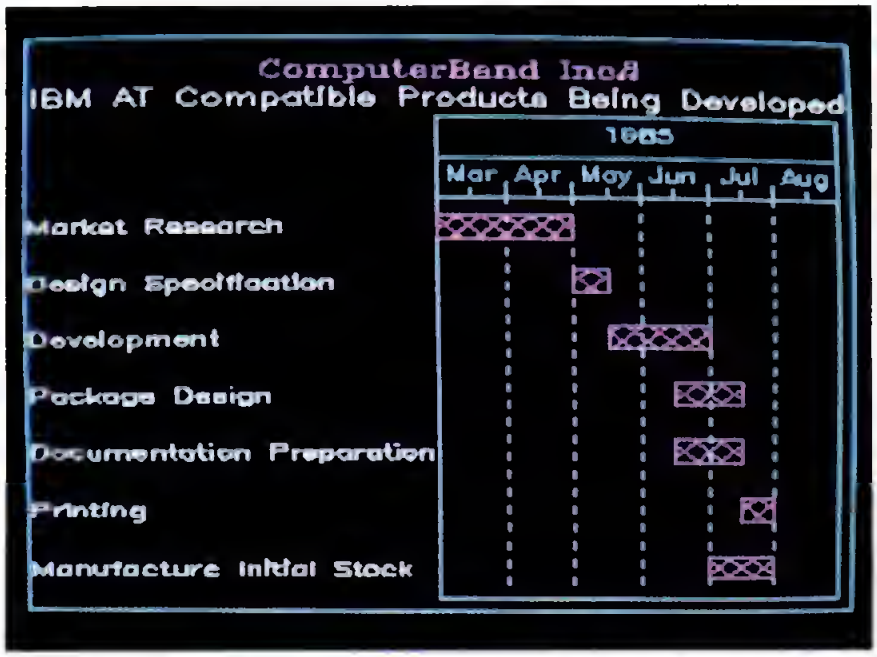
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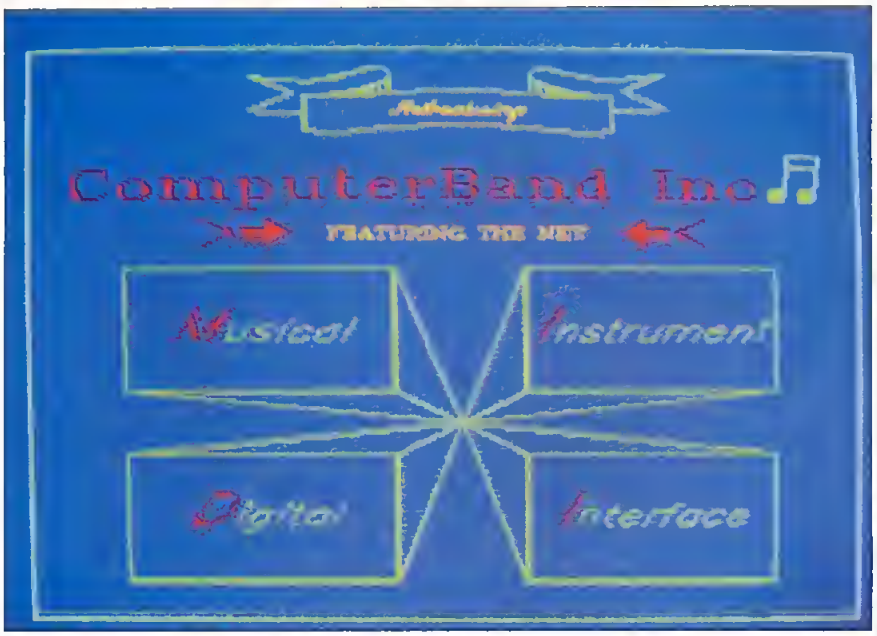
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Gantt Chart: The *Diagram-Master* Gantt Chart module produced this image by prompting the user for title lines, major and minor time divisions, activities, and bar attributes (including up to three types and choices of several patterns of colors). You can also choose to display a bar legend, which is not shown here, and bars can be shown in either layered or segmented formats. For screen display, users have a choice of two formats: red, green, and brown; or cyan, magenta, and white (the background colors are chosen during installation). In this chart, originally only the bars were red and the rest of the type green; the changes were made by changing the color numbers while editing the text format.



Advertisement: In this ComputerBand "advertisement," the banner and the 3-D boxes are from the *Diagram-Master* library disk. They are kept on the library disk rather then as part of the saved image, so that you must have the library disk in drive A: whenever you reproduce the image. The arrows were drawn using the shape menu; they are simply lines that are formatted to a certain color, line type, thickness, and fill. The size and shape of the arrowhead and tail are also part of the line formatting. Boxes, polygons, circles, ovals, and arcs can be similarly formatted to produce a large variety of shapes and fonts.

design ensures that users can find their way through its multitude of choices with a minimum of stress. There are menus for everything, and it takes a very short time to learn how to negotiate the creation of a chart. The large number of type, color, size, format, and other options are made less overwhelming by obviously careful attention to user needs, although for anyone with less than total recall, the manual is needed in order to choose type faces, images from the library, and so on.

Of course, too many choices can create problems as well. The large number of disks requires an overwhelming amount of juggling, so that the product is almost unusable on a non-hard-disk system. The use of the important library disk is also problematic. According to Decision Resources, the library files take up a great deal of memory and therefore were not included in the installation procedure. Since a library image is not copied into your data file, the program will need the library disk in the A: drive in order for any of its images to be included in a diagram—and there are, unfortunately, no prompts to tell you when to use it. You simply get an error message.

If all you need are quick, basic diagrams, you may prefer a simpler product with fewer bells and whistles. However, those who are looking for software to create a variety of professional-quality business diagrams would do well to consider the very useful *Diagram-Master*.

—Barbara Krasnoff ■

PC FACT FILE

***Diagram-Master*, Version 5.0**
Decision Resources Inc.
25 Sylvan Road South
Westport, CT 06880
(203) 222-1974
List Price: $245
Requires: 320K RAM, two disk drives or one hard disk, DOS 2.0 or later, color monitor with IBM color/graphics adapter or non-IBM monochrome monitor with IBM color/graphics adapter.
Diagram Types: Organization charts, Gantt charts, free-form and presaved graphics
Accepts Imported Data? No
Output Devices: Most major printers and plotters, Polaroid Palette

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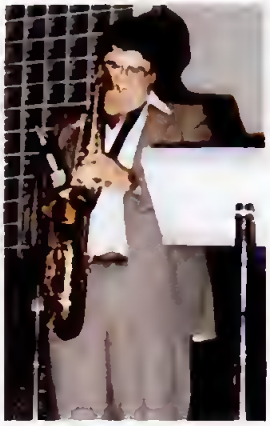
"This business is like music. The market plays the melody and we play the chords. Some people get lost in the changes."



No one would hire him. He was newly arrived from another country.

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As a younger man in the '60s, he played the saxophone and wanted to change the world. But all he really hoped for at the start was to

KING KAHN



Philippe Kahn
President and Founder, Borland International

earn enough to bring his family from France to join him.

Today – only three years later – Philippe Kahn and his company, Borland International, are acclaimed as heroes of the IBM PC industry.

Success on Success on...

Since he couldn't find a job, Kahn decided to gamble: he'd run an ad and try to sell a product he'd originally created for himself. After all, he reasoned, if he found it useful, others might too.

The product was used to write software for the new IBM PC. Since it accelerated and simplified the programming language, Kahn called it Turbo Pascal.™



Borland started above Morio's. Its new headquarters is only blocks away – so everyone remembers how they began.

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Then came Sidekick.™ A software combination of seven desktop accessories that literally everyone in business can use, for the unheard-of price of less than $100.

Sidekick revealed more clearly what Kahn has been up to all along: providing high-quality, easy-to-use software at an affordable price for anyone who uses a PC. All of Borland's six products to date are productive, intuitive, not copy-protected and inexpensive.

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In a market where overpriced and underperforming products are too often the norm, it's little wonder that Philippe Kahn has become a hero.

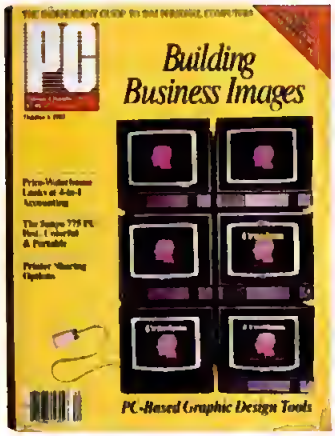
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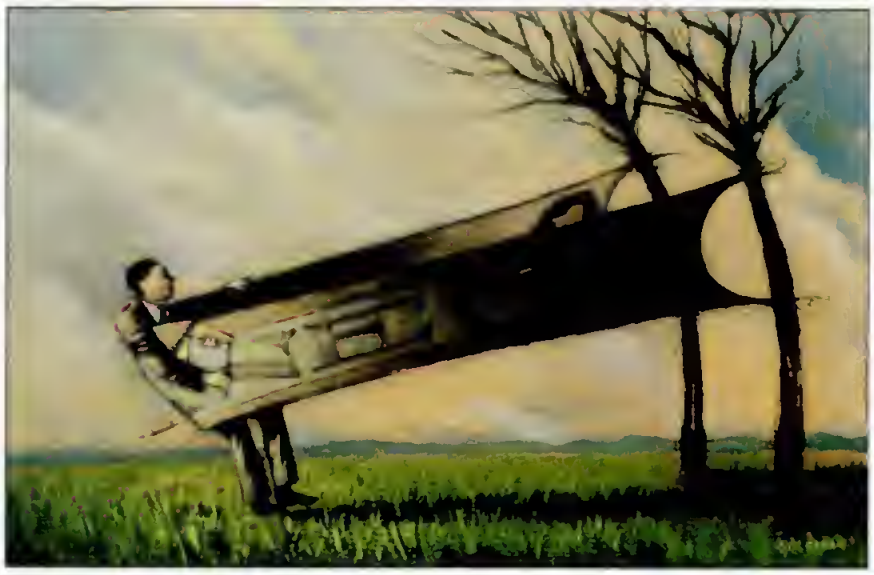
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Look closely before you invest a lot of valuable time and money in a computer seminar. With a little extra effort, you can choose a course with big dividends for you and your business.



The sign on the door of a motel conference room in Bethesda, Maryland, reads, "Data Communications and Networking for the Personal Computer." Forty-two men and women, mostly briefcase-carrying and blazer-clad professionals, listen attentively.

"To travel from one place to another, you may take a bus. To change to go to another city, you use a port. A data bus is what the characters in a computer ride on . . .," says Dr. Fred Stern, as he draws a symbolic bus on a flip chart. This explanation may be simplistic, but some of these participants in the seminar held by the Software Institute of America (located in Andover, Massachusetts) are learning about computers for the first time. And even though the class began with a simple concept, by the end of 3 days, Stern will have led the students into the complexities of peripheral sharing, network hierarchies, and networking policy issues.

Though he's not a true businessman in the Fortune 500 style, Stern seems to know exactly what's going on in offices around the country. Accompanied by his audience's knowing laughter, he paints a verbal picture of people scrambling to find ways to connect their PC's to one another and to the mainframe, stumbling over cables that snake across the office floor.

Illustration: Bart Goldman

Continuing Computer Education

Acquiring PC skills and keeping up to date is a challenge no one has to face alone. Here are some organizations that offer personal computing courses.

American Management Associations
135 W. 50th St.
New York, NY 10020
(212) 586-8100
Sample Course Offerings: "How to Use Your Personal Computer," "BASIC: A Computer Language for Managers," "Advanced BASIC: Improved Programming Techniques for Managers," "How to Use *dBASE II* on Your Personal Computer," "Business Graphics and the Personal Computer," "Word Processing and the Microcomputer," "Using Lotus's *1-2-3* in Business Applications," "Project Planning and Control Using Personal Computers," "Using the *Framework* Software Package," "Using the *Symphony* Software Package," "Using Small Computers in Marketing and Sales Management," "Using Personal Computers in Purchasing."

Architecture Technology Corp.
P.O. Box 24344
Minneapolis, MN 55424
(612) 935-2035
Sample Course Offering: "PC LAN Software," "LAN Industry Status," "LAN: *1-2-3*," "PC LAN vs Multiuser Systems."

Association for Systems Management
24587 Bagley Rd.
Cleveland, OH 44138
(216) 243-6900
Sample Course Offerings: "Local Area Networks," "Microcomputers: A Tool for Increased Productivity," "Personal Computers in the Business Environment."

AT&T Technologies Inc.
P.O. Box 1000
Hopewell, NJ 08525
(800) 221-1647
Sample Course Offering: "Fundamentals of the UNIX Operating System for Users."

CBE Systems
13 Acorn Dr.
Hawthorn Woods, IL 60047
(312) 438-8271
Sample Course Offerings: "Lotus's *1-2-3*," "*dBASE II*," "*Symphony*," "*Framework*."

Center for Advanced Professional Education
1820 E. Garry St., #110
Santa Ana, CA 92705
(714) 261-0240
Sample Course Offerings: "The IBM PC," "Personal Computers and Networking."

CES Training Corp.
680 Kinderkamack Rd.
River Edge, NJ 07661
(201) 599-9510
Sample Course Offerings: "Microcomputer Literacy Training for Trainers," "Lotus's *1-2-3* for Trainers," "*dBASE III* for Trainers."

The Cobb Group Inc.
301 N. Hurstborne, #115
Louisville, KY 40222
(800) 223-8720
Sample Course Offering: "Mastering *Symphony*."

Computer Forum
10 Langley Rd., #304
Newton, MA 02159
(617) 244-4710
Sample Course Offerings: "Lotus's *1-2-3*," "*dBASE III*," "*WordStar*," "*MultiMate*."

Datapro Research Corp.
1805 Underwood Blvd.
Delran, NJ 08075
(800) 257-9406
Sample Course Offerings: "PC Communications," "Micro Mainframe Connections."

Data-Tech Institute
Lakeview Plaza
P.O. Box 2429
Clifton, NJ 07015
(201) 478-5400
Sample Course Offerings: "Lotus's *1-2-3*," "*dBASE III*," "Networking Personal Computers," "LANs," "*Symphony*."

Information Center Services
1111 E. Putnam Ave.
Riverside, CT 06878
(203) 637-0099
Sample Course Offering: "Personal Computing Workshop for Management."

InfoSci Inc.
P.O. Box 7117
Menlo Park, CA 94025
(415) 854-1567
Sample Course Offerings: "Managing Application Software Support," "Rapid Prototyping."

Integrated Computer Systems
6305 Arizona Pl.
P.O. Box 45405
Los Angeles, CA 90045
(800) 352-8251 in Calif.
(800) 421-8166 elsewhere
Sample Course Offerings: "Implementing LANs," "Hands-on UNIX Workshop."

Personal Computer Management Association
11928 N. Earlham
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When Stern tosses out the phrase "the bottom line," the participants suddenly become more alert. Stern will be delivering another time- or money-saving tip to make their journeys through the PC jungle easier and quicker.

Booking Seminars

The Center for Advanced Professional Education of Santa Ana, California, books Stern's seminars as well as other courses targeted at managers and professionals responsible for planning, purchasing, and using personal computers. The company rents the meeting room, buys mailing lists, and sends out fliers to attract students. It also rakes in money—with 3-day course fees from $645 to $745, the gross income for the summer of 1984 was estimated at over $200,000. Instructors like Stern, who work for the booking company, are usually paid a daily rate plus an additional amount for each student enrolled.

More than 25 contractors, organizations like the Software Institute of America and the Center for Advanced Professional Education, offer seminars to teach businesspeople around the nation about computers. Course fees, which are paid in many cases by the participants' employers, range from the Association for Systems Management's—$120 for a 1-day session, "Local Area Networks"—to the Technology Transfer Institute's astronomical $1,595 for 5 days with computer guru James Martin ("forceful and magnetic on stage"), the author of *The Wired Society* and 30 other books.

Seminars can fill an information void created by the tremendous influx of PCs into the workplace. Ron Henderson, an instructor for the Personal Computer Management Association of Orange, California, feels that computer training courses, especially those that offer direct hands-on experiences with PCs, can help bridge the gap between software manuals and the actual running of programs.

"Ideally, training seminars give you a concentrated block of time, 2 or 3 days away from the office, in an environment with your peers," he says. "The permissive setting gives you freedom to try things out and make mistakes. The best seminars also give you the shortcuts and tricks of the trade that the manuals don't mention. They can save you hours of actual office time."

Many seminar enrollees are pleased with the classes they attend. One business professional comments, "If a seminar saves me even 1 day of work, it's well worth the time and the cost to my company." The unbiased consumer tips that seminars offer may also save a company thousands of dollars. And some benefits, although not quantifiable in financial terms, may be equally valuable. Many participants, for example, leave the seminars with a new sense of confidence. They can cope with their machines' enigmatic complexities and quirks more easily.

Other enrollees are more skeptical of the merits of seminars. "I've been to some

Be a Smart Seminar Shopper

Read between the lines of those slick promotional brochures offering crash courses in PC use. Can you actually become an expert in only 3 days?

Shop smart when choosing a computer seminar. The following guidelines will help you to be a better consumer.

Examine the Expected Audience

Look for the paragraph defining who the developers targeted as the audience for the course. If you're a novice, you may find yourself over your head in a course aimed at data processing systems and operational personnel. If you're an experienced programmer, avoid getting stuck in a course that requires no previous knowledge of computers.

Demand a Refund Clause

Don't register for a course that does not include a clause guaranteeing satisfaction or your money back in the contract. Some booking companies promise to refund your fee only if you leave the first day, but if it doesn't meet your needs, you should be able to walk out of a course anytime.

Seminar companies' policies differ. The refund policy of New York's American Management Associations is a good one: "If you have paid your fee and are not satisfied with the course you have taken, the AMA will be glad to give you credit toward another course of comparable length or refund your fee." Similarly, the American Institute for Professional Education of Madison, New Jersey, states, "If, during the course, the participant notifies the instructor of his/her desire to withdraw, the attendee may leave and receive a full refund."

Delay Registering

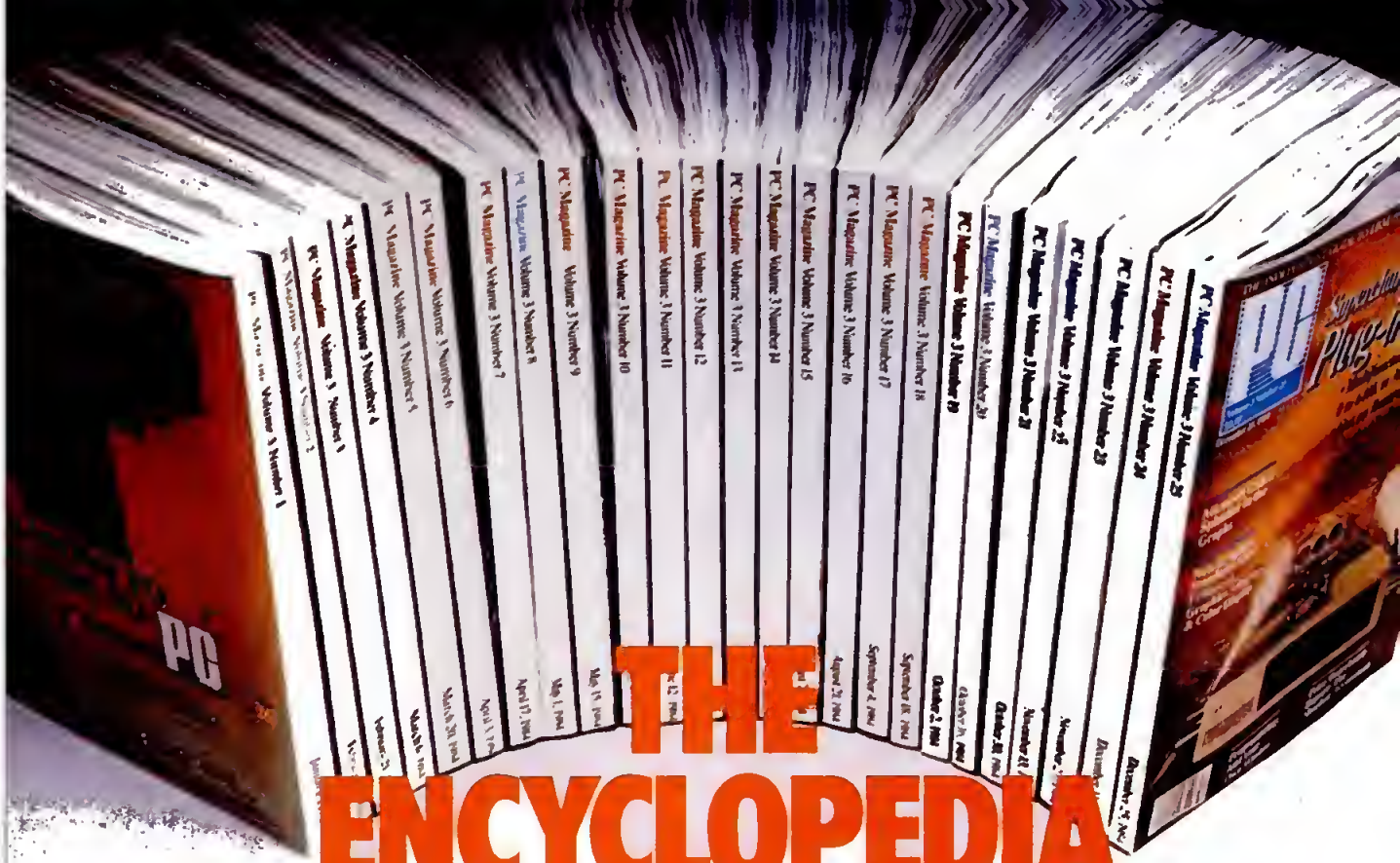
Register close to the time of the seminar rather than months in advance. Although seminar bookers would like you to think class size is limited, it rarely is. This way if your plans change, you're not stuck with a cancellation fee, which could be a $100 service charge when canceling anytime after 2 weeks prior to the meeting or 50 percent of the entire fee when canceling within 3 days of the scheduled meeting. If you register too early and must then cancel, you could end up paying $300 for *not* attending.

Review Advertising Promises Carefully

Be sure to look over carefully what the seminar will cover. Most promotional brochures are full of so much hype that it's often hard to tell what the course actually entails. Look closely at circulars promoting courses; you should know what you're supposed to get.

Consider Hiring the Instructor

No matter how closely the course matches your needs, if five or more people in your business could benefit, you may want to hire the instructor to come to you. Paying the expert directly is more cost-effective than paying course fees plus transportation, housing, and food for a number of people. Most PC consultants are eager to tailor on-site courses to your company's needs, since they profit more when the booking company is out of the picture.—**Sandy Jones**



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seminars that didn't cover what I expected," says Joe Thompson, a veteran of many seminars. "For instance, in 3 days I might get only two things I could carry away and use. And the promised books didn't arrive, or the handouts didn't match the presentation," he notes.

Jerry Herskovitz, a Baltimore accountant and computer consultant, is still bitter about a seminar he feels he got burned on. "The lecturer came in with these charts. He put them up on the wall and simply read through them—no explanation, nothing. Everything he said was completely over the audience's heads. I wanted to walk out the first day, but the instructor begged me to stay. I did, but it was a complete waste of my time. When I contacted the booking company for a refund, it refused to give it to me because I had stayed for the whole course. I'm still feuding with it, trying to get my money back." Higher fees don't necessarily indicate more impact on the participants. One data processing manager registered for Martin's seminar, attended by 400 people. His reactions were negative.

"James Martin was knowledgeable, creditable, and vivacious as a speaker, but frankly, I was disappointed. I paid all this money and came away with nothing useful. He spent too much time on the nonimplementable and nonavailable systems . . . too much time on the technical and future issues. That's fine if you want a bird's-eye view of what's coming, but it sure wasn't what I wanted or needed."

One reason why computer training seminars are proliferating is that vendors are doing little to help close the PC information gap on the local level.

Vendor Training Trap

One reason why computer training seminars are proliferating is that vendors are doing little to help close the PC information gap on the local level. Information from computer stores and mail-order vendors is suspect because their sales orientation may bias what they tell consumers.

One computer store manager who advertised for a trainer confessed that "the bottom line is that we want someone who's aggressive and who can *sell*." The trainer would be paid a commission based on sales generated from the course. It's clear that participants may get a sales pitch disguised as training when they enroll in this vendor's classes.

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YOUR SEMINAR DOLLAR

departments of colleges and universities have also failed to make a dent in the training problem. They are still geared to educating programmers. As one seminar participant explains, "They're geared to tell you how to *write* Lotus's *1-2-3*, not how to *run* it."

Accountant and computer consultant Jerry Herskovitz claims that the problem with college courses is "they don't come down to the level of computing that people can understand. They're too theoretical—you don't get the kind of practicalities you need in the business world."

Unfortunately, most institutions take as long as 1 or 2 years to introduce new course offerings. By that time a planned microcomputer curriculum may already

Colleges have failed to make a dent in the training problem. They are still geared to educating programmers: They tell you how to write Lotus's 1-2-3, not how to run it.

have become obsolete. Dr. Glenn Stambaugh of the mathematics and computer science department at Pennsylvania's Shippensburg State College notes that "many colleges are stuck with obsolete computing equipment and a tight budget that prevent them from keeping up with current trends. Most of them are about 3 to 5 years behind the times."

With PC information multiplying so quickly, intensive training seminars may be the best available way to keep yourself and your employees abreast of the hardware and software explosion. If you decide to go with training seminars offered by independent training consultants, you'll want to make sure you choose the right ones.

A training seminar's success depends almost entirely on the person who is teaching it. With an energetic instructor at the front of the room, like Fred Stern, who knows how to walk the students through information that ranges from the simple to

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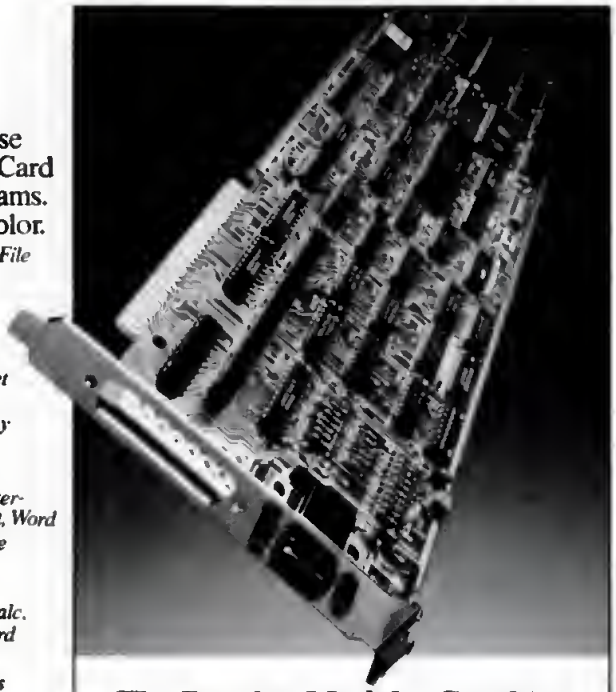
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Adventure Enterprises, *Sea Dragon*
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Avalon Hill Game Company, *Andromeda Conquest, Computer Football Strategy, Computer Stocks & Bonds, V.C., Voyager*
Broderbund Software, *Serpentine*
CBS Software, *Match-Wits, Mystery Master: Murder by the Dozen*
Hayden Software, *Sargon III*
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Penguin Software, *The Quest*
Priority Software, *Forbidden Quest*
Scarborough Systems, *Buck Rogers, Congo Bongo, Star Trek*
Sentinent Software, *Cyborg*
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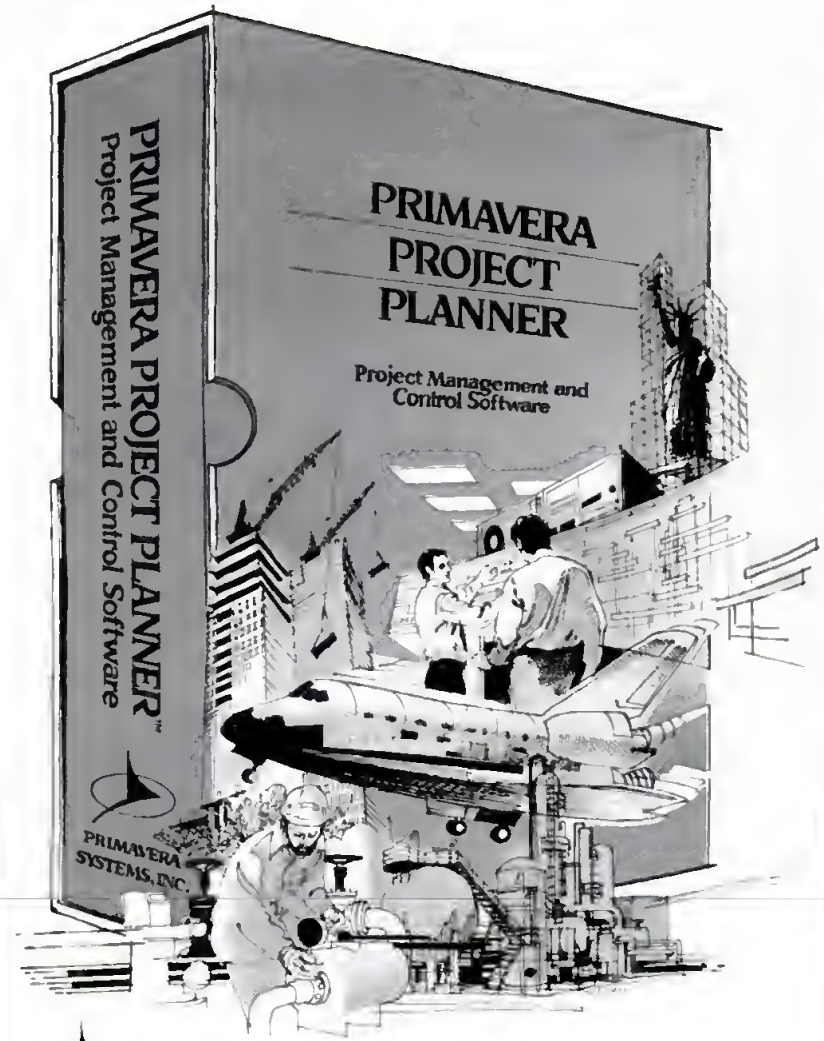
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the complex, the hours pass quickly as the class covers a vast amount of material. But if you get a dud for a teacher, you're in trouble. Seminar veterans tell about highly intellectual computer "technofreaks" who spout information to impress everyone, only to lose the entire audience in less than an hour. They also complain that some instructors lull the participants to sleep with their boring, monotone voices after the first hour.

Model Seminar

One seminar that will keep you awake is the one on *1-2-3* that the Personal Computer Management Association offers in eight cities. Two instructors teach the course—Ron Henderson, the seminar leader mentioned earlier, and Gerry Resch, who has over 23 years of experience with computers.

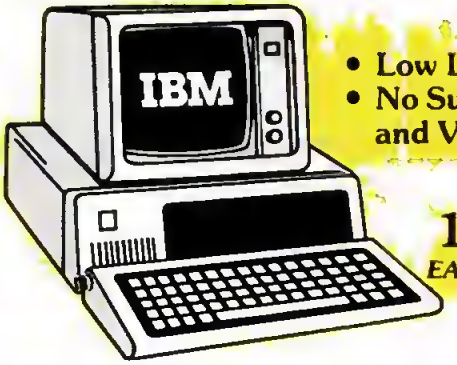
Here's how Henderson and Resch ran a recent seminar: They flew in a day early to wire the motel meeting room, installing 1 PC for every 3 students who had enrolled—15 computers for 43 participants. During the classes they assigned simple yet informative tasks on the machines, with every task worked out in detail in a workbook. They interspersed their lectures illustrated with the help of an overhead projector, with stories of their actual experiences.

By the time the 2 days were over, every student had become a virtual *1-2-3* expert. They now had tips and shortcuts under their belts that would have taken them months to tease out of the manual. The enrollment fee? $545.

"I want people to know the material and how to apply it well," says Henderson, a self-educated computer expert. (His Ph.D. and former teaching experience are in philosophy.) "The course has been laid out in a proper gradient so that students don't get overwhelmed," he notes. "If I had targeted it too low for my student's abilities, they would get bored. If it were too high, they would quickly get lost."

How can you make sure your instructor is going to be as skilled as Henderson and Resch? Check out their skills and abilities before taking the course. Ask business associates who've taken courses. Request that the booking company give you the names of former students so that you can

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call them and ask whether the course will be worth your investment. Or find out how you can contact the instructor to interview him or her before signing up for the course. Simple questions such as what topics the instructor plans to cover and what audio-visual aids he or she plans to use may help you get an idea of the leader's experience, information, and presentation skills.

The second most important factor is class size. As the number of bodies in the classroom increases, the effectiveness of the instructor decreases. Yet the companies that book seminars usually ignore this corollary and take every registrant they can find. You may find yourself tightly packed into a tiny seminar classroom with

Simple questions such as what topics the instructor plans to cover and what audio-visual aids he or she plans to use may help you get an idea of the leader's experience and presentation skills.

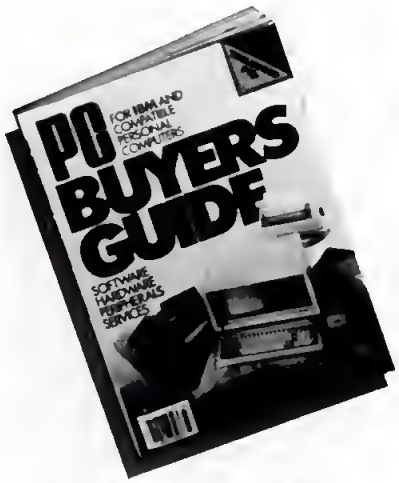
100 other people. Your questions may go unanswered with so many people clamoring for the instructor's attention.

The final test of a computer seminar's value lies in what you get out of it. Does it make your job easier? Does it shorten the amount of work time you'll need to get your software up and running or your PCs linked and interacting with each other? Does it give you "inside" consumer advice to help you choose hardware and software? Finally, will it give you that intangible sense of self-confidence so that you go back to work feeling more aware and more in control of what goes on inside your PC?

If you can answer yes to these questions, the information and confidence you've gained may be well worth the course fee. ■

Sandy Jones is the author of four books and many magazine articles. She has a master's degree in psychology.

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CIRCLE 347 ON READER SERVICE CARD

Just as 2,400 bps is becoming a widespread standard, DCA's FASTLINK leapfrogs over 2,400 and 9,600 with an impressive new modem technology that may be ideal for heavy-duty data transfer.

FASTLINK

COMMUNICATING AT 10,000 BPS AND UP



As the old saw has it, time is money. That's especially true when you're dealing with on-line communications, where the cost of a phone call depends in no small part on how long it lasts. With all other things being equal, if time is money, then faster must be better, and anything that promises to speed your communications up by more than 400 percent certainly deserves your attention.

"Anything" in this case is IRMA's FASTLINK modem from Digital Communications Associates, a speedy device that zips along at a claimed rate of 10,000 bits per second. That translates to 1,000 characters per second and up—fast enough to send a 3,000-word text file (the approximate length of this article) from modem to modem in under 20 seconds. And with its innovative approach to communications technology, FASTLINK can still talk at slower speeds with standard 300-bps and 1,200-bps modems.

If you've had much experience in transferring files by phone, these numbers should have caught your attention.

Photograph: Vittorio Sartor

How Fast Is It?

The standard speeds on most communications software are 300, 600, 1,200, 2,400, 4,800, and 9,600 bps. Most modems operate at 300, 1,200, or 2,400 bps. Slower standard speeds such as 110 bps exist, but these are rarely used on microcomputers. There are also faster speeds—notably 19,200 (or twice 9,600) bps—but according to the IBM specifications, the asynchronous communications card only supports up to 9,600 bps. In any case, no such setting for 10,000 bps exists.

The first time I saw the claim of 10,000 bps for FASTLINK, I thought that the modem's actual speed must be 9,600 bps and that someone had rounded that figure up. I was right about the rounding, but wrong about the direction. According to DCA, the modem actually operates at speeds as high as 14,000 to 15,000 bps but has a typical throughput—the useful information that is transmitted—of 10,000 bps or better.

Two obvious questions arise: First, where does the 14,000- to 15,000-bps figure come from? Second, how does the modem manage such high speeds when the PC goes up to only 9,600 bps?

The 14,000 to 15,000 bps rate comes from FASTLINK's unusual approach to communications. Most modems are designed to run at one or more specific speeds, such as 300 bps and 1,200 bps. They are also designed so that the computer must be set for the same speed that the modem is using during any given call. A mismatch in speed between computer and modem results in garbled information.

When talking to a 300- or 1,200-bps modem, FASTLINK behaves like conventional modems; but when FASTLINK is operating in its fast mode, the speed of communications between it and the PC is independent of the speed between modems. In three consecutive phone calls, your FASTLINK may talk to another FASTLINK at 15,000, 8,000, and 12,000 bps—all without affecting the speed of communications between the PC and FASTLINK.

Of course, the actual number of bits going from PC to FASTLINK has to match the number of bits going over the phone line. FASTLINK accomplishes that trick through flow control, a process that lets it send a signal to the PC telling it when to stop and when to start sending information. The result is that if FASTLINK is sending a file at 8,000 bps, the PC will average 8,000 bps by sending bursts that are much faster—depending only on the speed setting for communications between PC and FASTLINK.

> When two FASTLINK modems communicate, they continuously monitor the quality of the phone line and adjust their speeds accordingly. FASTLINK has the smarts to make changes every few milliseconds.

This loss of linkage between the PC-to-modem speed on the one hand and modem-to-modem speed on the other frees FASTLINK to play fast and loose with the speed of communications when it's talking with another FASTLINK modem.

When two FASTLINK modems communicate with each other, they continuously monitor the quality of the phone line and adjust their speeds accordingly. As a full-duplex modem, FASTLINK even takes note of how much information is flowing in each direction, then preferentially assigns more communications channels to the direction that needs them more.

According to DCA, FASTLINK has the on-board smarts and calculation speed to make changes every few milliseconds as necessary. If line conditions are poor or deteriorating, FASTLINK drops its speed in increments of less than 100 bits at a time until it finds the maximum speed for accurate transmission. If line conditions improve, FASTLINK raises its speed, but it will not try raising the speed during a file transfer.

Under optimum conditions, FASTLINK will communicate at 14,000 to 15,000 bps. Obviously, this speed is irrelevant if the PC goes up to only 9,600 bps, but according to DCA, the 9,600-bps limit on the IBM async card simply isn't real.

"Ultimately, the limiting factor for speed on the PC is the 8250 chip on the async board," says a DCA company spokesperson, "but the practical limit is the software. The only reason people haven't tried over 9,600 until now is that they've had no reason to do it. Now they have a reason."

In fact, FASTLINK is designed to talk to the computer at 19,200 bps, although it can also be set for slower speeds. And apparently a PC can handle the high speed—both in my tests and according to DCA. "IBM did not want to endorse 19.2k as a continuous speed," said the DCA spokesperson, "but the modem doesn't do 19.2 continuously—only in bursts. And we've had no trouble running the PC in spurts at 19.2."

Fastware

Of course, you can't run your PC at 19,200 bps unless your communications software includes that speed as an option. DCA has already solved that problem for you. The internal version of the modem comes bundled with a modified version of *CROSSTALK XVI*, called *CROSSTALK-FAST*. The external version comes without software, but you can buy *CROSSTALK-FAST* separately for $195 or upgrade from *CROSSTALK* to *CROSSTALK-FAST* for just $50.

From the user's point of view, *CROSSTALK-FAST* looks like *CROSSTALK XVI*. It has the same commands, the same screens, and even the same manual—except for about a dozen replacement pages that apply specifically to the FASTLINK. If you already use *CROSSTALK*, you'll hardly notice the difference.

If you're new to *CROSSTALK*, you'll find that the new user script will get you started quickly. You'll also find that several Alt keys are already custom-installed for the modem. For instance, Alt-F1 puts cus-

PC FACT FILE

IRMA's FASTLINK
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CIRCLE 687 ON READER SERVICE CARD

File Transfer Times

	AT to PC effective throughput		PC to AT effective throughput	
	Direct connection (bps) (in seconds)	Phone connection (bps) (in seconds)	Direct connection (bps) (in seconds)	Phone connection (bps) (in seconds)
BEST				
Instantaneous data transmit speed	15,111	14,819	15,111	15,111
Instantaneous data receive speed	15,111	15,111	15,111	14,819
System throughput	8,832 1.53	7,736 2.09	8,832 1.53	8,530 1.57
Modem throughput	10,081 1.39	9,415 1.46	10,396 1.36	10,396 1.36
WORST				
Instantaneous data transmit speed	15,111	14,819	15,111	15,111
Instantaneous data receive speed	15,111	15,111	15,111	9,198
System throughput	8,456 1.58	6,789 2.27	8,603 1.56	8,530 1.57
Modem throughput	10,081 1.39	7,984 2.05	10,081 1.39	10,299 1.37

This table shows the best and worst times for transferring a 100K file from the AT to the PC and vice versa, both with modem connected directly to modem and with modems connected through the phone lines. Often, however, the difference between the best and worst times is very small—sometimes just a fraction of a second.

Instantaneous data transmit and receive speeds are computed by FASTLINK and indicate the quality of the line. System throughput is measured from the moment *CROSSTALK-FAST* is told to send the file to the moment it announces completion. Modem throughput is measured from the actual start of transmission to the actual end. System throughput is the best measure of how fast things look from the user's point of view.

tomer support information on your screen, and Alt-F10 asks the modem for the current data rates. Be forewarned, however, that *CROSSTALK* is not an easy program to master, and the manual is a better reference guide than tutorial.

If you have a favorite communications program other than *CROSSTALK*, you might still be able to use it. According to DCA, most software can be set to 9,600 bps or slower and will work with FASTLINK's fast mode, though it will not perform optimally. I tried it with *PC-TALK III* at 9,600 bps and had no problems. But DCA stresses that to maximize efficiency, the computer-to-modem speed really should be higher than the capability of the modem. And that means using *CROSSTALK-FAST*, or some other package capable of 19,200 bps and hardware flow control.

There is also another complicating factor. Given the high speeds of the FASTLINK modem, error correction is a necessity. Recognizing that, DCA built an error-correction feature into the modem itself. Unfortunately, most communications programs also insist on doing error checking during file transfers, which only serves to slow things down. To take best advantage of FASTLINK'S error correction, you have to be able to reset the software's timing and block size to increments that are large enough not to interfere with the FASTLINK protocol.

There is also another potential software problem, at least with the internal version of the modem. The internal FASTLINK uses a different crystal than the one found on a standard PC async board. This means that the internal FASTLINK needs a different baud rate divisor to work at exactly the right speed for 300- and 1,200-bps communications.

CROSSTALK-FAST deals with this problem by coming in a special version for the internal FASTLINK. And because *CROSSTALK-FAST* comes bundled with the modem, it effectively eliminates the problem. If you want to use some other program, however, you should be aware that the baud rate divisors are likely to produce speeds that are just out of tolerance range for any given modem on the other end of the line. According to DCA, if this happens, FASTLINK will usually be able to talk with the other modem at 300 and 1,200 bps, but there will be more errors than you would normally expect.

At the moment, *CROSSTALK-FAST* is the only software package that can take full advantage of FASTLINK's capabilities. But this won't be true for long. A company spokesperson says that since announcing FASTLINK, DCA has been swamped by inquiries from software companies and is currently working with several software houses to modify their communications programs for optimum performance. Some additional packages may be available by the time you read this.

How Fast Is It Really?

It's all well and good to talk about optimizing communications with FASTLINK, but it's more helpful to understand what that means in terms of actual speed.

Unfortunately, given FASTLINK's variable speed, any specific number you choose to hang on the modem is somewhat arbitrary. As I've already mentioned, DCA claims that 10,000 bps is a conservative measure of the modem's throughput under typical line conditions. As a comparison, DCA stresses that throughput for a typical 9,600-bps modem is about 7,000 to 8,000 bps when error correction is used. But the issue of the modem's speed deserves a closer look.

One very nice touch built into FASTLINK is a pair of commands that will report the instantaneous rates for both transmission and reception of data. I connected two FASTLINKs with a 6-foot phone cable to produce an essentially noise-free line and wound up with instantaneous readings of 15,111 bps in both directions.

I then transferred a 100K file back and forth several times between a floppy-based PC and a hard-disk-based AT, using the XMIT command in *CROSSTALK-FAST*. Starting from the moment that *CROSSTALK* actually began sending the file and ending with the moment it finished send-

ing the last block, the measured speed of the transfer varied from a low of about 10,080 bps to a high of about 10,395 bps.

Significantly, the transfers from the hard-disk-based AT all came in on the slow side, while the transfers from the floppy-based PC did somewhat better. That difference—amounting to a few seconds overall—is almost certainly caused by the difference in disk access times in the two computers. The PC takes longer to write the incoming information to disk. But in any case, the throughput on the FASTLINK certainly tops 10,000 bps.

In more realistic conditions, with the modems connected through the phone lines, a typical instantaneous data reading was 15,111 bps in one direction and 14,819 bps in the other. The measured speed of transfer, meanwhile, varied from a low of 7,984 bps to a high of 10,396 bps.

Also worth noting is that in two cases the line quality was so poor that the data rates dropped below 5,000 bps in each direction. In both these cases, the modems eventually gave up, losing the connection and sending a "Lost Carrier" message to my screen.

In retrospect, this loss of carrier wasn't particularly surprising. Given that the FASTLINK's data rates vary with the quality of the line, you can actually use the data rates as a measure of line quality—a highly useful feature. According to DCA, anything less than 7,000 is considered "poor." This is one step below marginal (7,000 to 10,000 bps) and probably indicates that you should hang up and try calling back.

A Mild-Mannered Exterior

If you're familiar with micro-to-mainframe communications, you probably recognize the IRMA in FASTLINK's appellation as the name of DCA's coaxial cable interface between micro and mainframe. Don't let that throw you. Aside from its speed, FASTLINK is a fairly standard autodial, autoanswer modem for PC-to-PC communications. According to DCA, the "IRMA" is there only to maintain product line identity. The technology was developed by Telebit Corp., which sells the identical modem under the name TRAILBLAZER. If you're already comfortable with communications, you'll find that setting up and using FASTLINK presents few complications. If you're new to communications, you'll find that FASTLINK is no harder to start with than most other modems, and easier than some.

FASTLINK comes in two versions. DCA sent *PC Magazine* one of each for review. The $1,995 internal modem comes on a board that fits into any full-size slot in a PC, XT, or AT. The $2,395 external version is a standard RS-232 modem, meaning it connects to your PC through a cable that plugs into the computer's serial port. Both versions are direct-connect modems, meaning that they plug directly into a standard telephone wall module using a cable that comes with the modem. Both also have a second modular phone plug in the modem where you can plug in a phone.

How FASTLINK Works

FASTLINK uses some interesting, and smart, new technology to achieve its breathtaking speed.

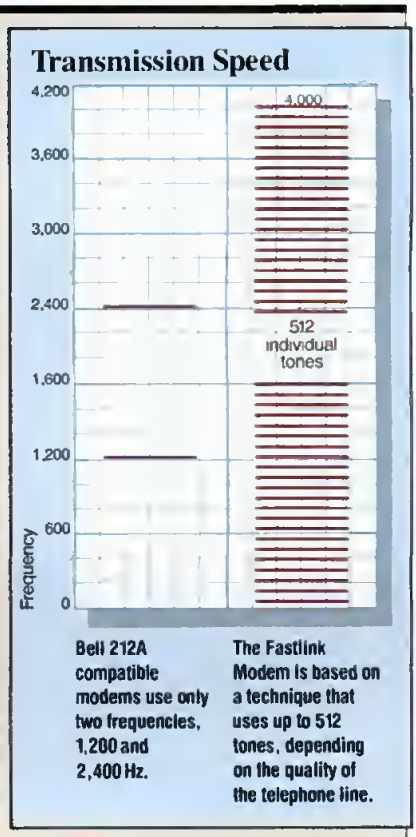
FASTLINK uses what is called a multicarrier modulation scheme. Modems send information over the phone lines by encoding bits of data on audible tones. Most modems limit themselves to either two or four tones of specific frequencies. With Bell 212-compatible modems, for example (see chart at right), the modem in "originate" mode sends data on a 1,200- Hz carrier and listens for the other modem at 2,400 Hz.

FASTLINK can use up to 512 carrier tones spanning the entire phone bandwidth from 0 Hz to 4,000 Hz (300 Hz to 3,400 Hz on long-distance circuits). And that's only the beginning.

Standard modems accept data from the computer, encode the carrier, and blindly send the data out the phone line using the prearranged frequencies and speed. FASTLINK actively analyzes the quality of the phone line and adjusts its carriers and communications speed accordingly.

When two FASTLINKs establish communications, they begin by generating 512 carrier tones to fill the phone bandwidth. FASTLINK then looks at each tone, checking it for distortion, noise, amplitude variations, and other signal impairments. Based on this, FASTLINK decides which frequencies can function as carriers and how many bits per second each carrier can handle.

FASTLINK also analyzes how much data is flowing in each direction and assigns carrier time accordingly to maximize the information flow. The data flow in one direction can therefore be significantly different from the data flow in the other, which is why FASTLINK will generally give two different readings for received data rate and transmitted data rate.—**M. David Stone**





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Physically, the external version is surprisingly large, measuring 8½ inches wide, 12⅓ inches deep, and 2 inches high. Compare this to the 5¼ inches wide, 6½ inches deep, and 1¼ inches high that the Hayes Smartmodem measures. The room is occupied mostly by the power supply that's needed for both the 1 megabit of on-board memory and the two on-board processors—a Motorola 68000 and a TMS 320 signal processor.

Most external modems for the PC fit comfortably on top of the systems unit next to the monitor, or unobtrusively under a desk phone. FASTLINK is too big for that. If the real estate on your desktop is at a premium, you may have trouble finding room for it. On the plus side, the modem sports an attractive modern design that puts most other modems to shame, and an off-white color that is decorator-designed to fit in nicely next to your PC.

The external version of FASTLINK sports a bank of status lights. These include a modem-ready light, a terminal-ready light, and an off-hook light to let you know when the modem has picked up the phone. Furthermore, a receive-data light and a send data-light flicker when information is coming in or going out, and, finally, a pair of "fast" or "slow" speed lights indicate the speed of transmission. ("Slow" indicates a connection at either 300 or 1,200 bps.)

The external version of FASTLINK also has one other commonly found feature that the internal version lacks: a speaker that allows you to follow the progress of a call as it is being made. It indicates, for example, whether a call isn't going through because of a busy signal or because no one is picking up the phone. If you'd rather not hear the call being made, you can simply turn the speaker off.

Except for the status lights and speaker, the two versions of the modem are essentially identical. Both can communicate with standard 300-bps and 1,200-bps modems as well as with other FASTLINK modems at 10,000 bps. FASTLINK is also compatible with the Hayes 1200 command set—the de facto industry standard.

Like many of the newer modems, FASTLINK uses a superset of the Hayes Smartmodem 1200 commands and adds such capabilities as intelligent dialing, which means it can listen for dial tones and busy signals and can report call progress to your screen.

Is It a Hit or a Miss?

FASTLINK is obviously an impressive and potentially useful product. The only real question is whether you want to be the first kid on your block to own one. There are some real limitations that you need to be aware of before you buy.

Until and unless FASTLINK becomes a widespread standard on its own, it may actually slow down your communications by limiting you to 1,200 bps even where 2,400 bps is available.

First, there is no point in buying just one FASTLINK modem: You won't have anyone to talk to. The only valid reason for communicating at 10,000 bps and better is for heavy-duty file transfer. This means that FASTLINK is meant for those individuals who can potentially save a great deal of time transferring large files or a great deal of money sending files long distances.

DCA uses the example of sending all the files on a 320K disk. At 1,200 bps—based on AT&T daytime rates for a "typical" 1,000-mile call—the transfer takes 44 minutes and costs $18.23. At 10,000 bps, the same transfer takes just 5.3 minutes and cost $2.65, yielding a savings of $15.58. If this represents a typical work day, then you can save nearly $4,000 in phone bills in a single year, which almost pays for the cost of the two modems. If this example covers your situation, then two or more FASTLINKs should be high on your wish list.

A second limitation is that FASTLINK is not as flexible as it might be at lower speeds. In particular, it ignores the growing 2,400-bps standard, which has started to emerge in the past year. Cutting file transfer time by 50 percent over 1,200-bps modems (to 1 minute 15 seconds for an 18K-byte file), the new speed has become popular enough to prompt many on-line services to accommodate it. Granted, FASTLINK can go much faster, but only with another FASTLINK. Until and unless FASTLINK becomes a widespread standard on its own, it may actually slow down your communications by limiting you to 1,200 bps even where 2,400 bps is available.

What's more, even if FASTLINK does become a standard, you may still prefer 2,400 bps for some applications. FASTLINK is clumsy when working at the keyboard. Because the modem saves your keystrokes and sends them in packets, you can easily get several words ahead of the screen when you're typing.

This keystroke problem is obviously not important for file transfers—which is the function the modem is primarily designed for—but it can be distracting for interactive communications should you try using the modem that way. DCA says that 2,400-bps compatibility will be added to FASTLINK shortly, either as a standard feature or as an option, but current versions don't have it.

Third and finally, DCA's FASTLINK uses a proprietary communications scheme rather than a widespread industry standard that was developed by and is available to any number of modem manufacturers. This exclusivity could present a problem if the rest of the industry chooses to take a different route to high-speed communications, leaving FASTLINK owners out in the cold.

On the other hand, according to a DCA company spokesperson, licensing agreements with other modem manufacturers are under discussion, though it is premature to talk about them yet.

Ultimately, the decision to buy or not buy FASTLINK is a simple matter of cost justification. You have to sit down and calculate whether the modem will pay for itself in a reasonable length of time. If so, it is certainly worth considering. If not, you're better off waiting to see whether FASTLINK succeeds in becoming a new standard. ■

M. David Stone is a frequent contributor to PC Magazine.

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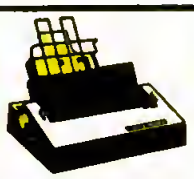
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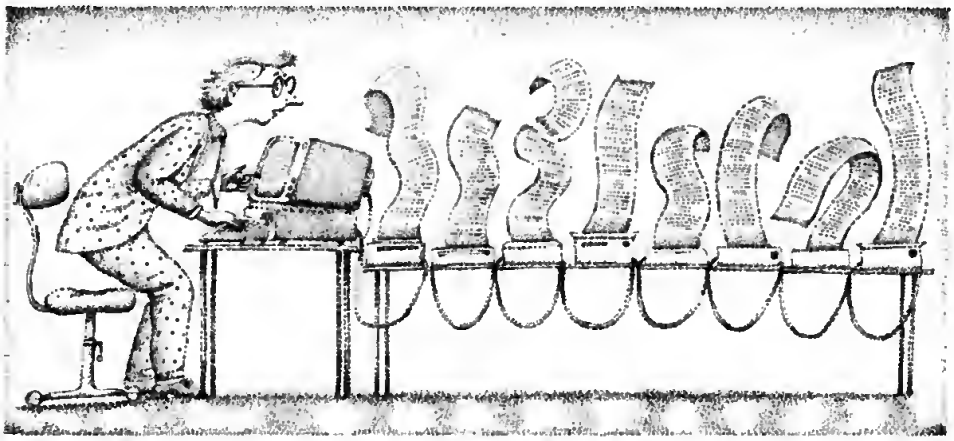
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These nine printer utility programs are designed to make it easy for you to capitalize on your printer's myriad features—even the ones you never knew were there.

Printer Utilities



Make the Difference

If you can't convince your printer to show off the special fonts and other features that dazzled you in the computer store, a printer utility program may be what you need. Printer utilities make it easier for you to send commands to your printer, telling it to change fonts or type sizes. These commands are usually explained in the machine's manual, but the instructions are often cryptic, and most users would rather not spend their valuable time figuring out how to send ASCII escape code sequences of hexadecimal values just to get a bold or condensed report.

Some of these programs are generic, but others are designed to work with a specific printer or program. For instance, *Marvel Print* works with the Okidata printers. Some utilities make *WordStar* sparkle, and others make your color printer shine.—**Alfred Poor**

Illustration: Peter Sis

IBM–Toshiba Printer Interface 1.2A

When the Toshiba P1351 letter quality dot matrix printer was designated an Editor's Choice in *PC Magazine*'s mammoth printer survey last year, the only complaint was that it was not strictly IBM compatible. The Toshiba could not print the extended character set of the PC, and it could not print a graphics screen with the PC-DOS GRAPHICS program.

Now, Integrated Data Technologies (IDT) has attempted to solve that problem with the *IBM–Toshiba Printer Interface* package. This package contains a program, Version 1.2A, that remains resident in memory to make the Toshiba P1351 compatible with the IBM PC. *(Just before press time, we learned of the release of Version 1.2B, which corrects file path errors in the font maker portion of the program.—Ed.)* The program is designed to use one of the two available downloadable fonts in the P1351 for the extended character set and to translate the IBM Graphics Printer escape sequences into the corresponding P1351 codes.

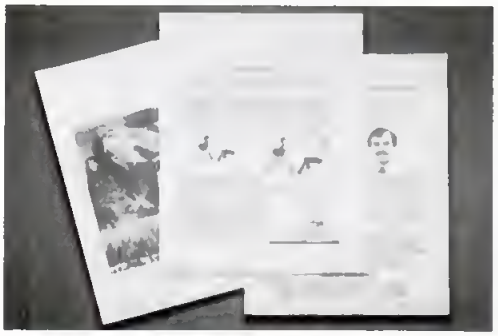
The interface is not entirely successful in handling either of these tasks. To use only one font for the extended character set, the IDT program must use the existing Toshiba graphics character set (including single-line and block characters) wherever possible. The characters, however, do not have the same look as the graphics character in the IDT font and do not connect on the vertical and the horizontal.

> IDT doesn't get the brass ring, but this package is a must for anyone who wants to hack the Toshiba P1351.

We tested the escape sequence conversion by printing a bar graph from Lotus's *1-2-3* set up for the IBM Graphics in single-, double-, triple-, and quad-density modes. The single- and double-density graphs printed quickly, but the small type was virtually unreadable. The triple-density mode, which took about 16 minutes to print, looked a lot better. Quad density took 42 minutes and made the graph 2 inches wider, but it looked really exquisite.

A README document details how to use the interface with several popular programs. If a program supports the P1351 directly, you may turn off the Interface program. Compatibility with the new Toshiba P1351 is also claimed. Since the P1340 and P1350 printers do not have down-

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loadable fonts, the character set extension will not work, but the escape sequence conversions should.

The IDT package also contains a hex dump program and a font-maker program that uses a full-screen display for entering dot patterns of custom fonts.

IDT should be commended for tackling what must have been a formidable job in this conversion program. They don't quite get the brass ring, but this package is a must for anyone who wants to hack the Toshiba P1351.—**Charles Petzold**

IBM–Toshiba Printer Interface 1.2A
Integrated Data Technologies Inc.
4775 Bunchberry Lane
Colorado Springs, CO 80917
(303) 488-2583
List Price: $79.95
Requires: 4K RAM more than the OS and resident programs, DOS 2.0 or later. For use with Toshiba printers, models P1340, P1350, P1351, and P351.

CIRCLE 700 ON READER SERVICE CARD

ColorScreenPrint

The name *ColorScreenPrint* is actually misleading because even though it dumps graphics screens to almost any popular color printer, it works just as well with ordinary black-and-white graphics printers. And this print utility handles so much more than just print screens; *ColorScreenPrint* also performs a number of interesting tricks, including sizing, rotating, and reversing images.

The *ColorScreenPrint* package includes a non-copy-protected disk that includes four installation programs totaling over 180K bytes. When you run them together, they automatically create the actual operating program CSP.COM. Applications Techniques Inc. made the installation process easy to use and completely painless. You simply make various selections from a graphically interesting menu. The installation creates a copy of CSP.COM that matches your computer to your printer. And you can run the installation software as often as you wish to create different programs for different printers.

More for Less

The command CSP loads *ColorScreenPrint* into memory. According to the manual, the program occupies about 48K RAM, but I found it took up significantly less. After you've loaded the program, you can call it up at any time using the familiar Shift-PrtSc key combination. This action does not start the screen dump but instead brings up the print menu. You have the option to use only part of the image, change its size, rotate it, or change its location on the page. (If you opt to change the size of an image, the software carefully calculates the change to keep the aspect ratio nearly perfect.) After you've made your choices, you start the printing.

An interesting feature of *ColorScreen-*

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Print when used with color printers is its ability to support 16 colors instead of the usual 4 or 8. When used with black-and-white printers, it substitutes dot patterns for colors.

Crashes with XyWrite

ColorScreenPrint works with any fully IBM-compatible computer equipped with either an IBM Color Graphics Adapter (or compatible adapter) or Plantronics PC+ and any supported printer. According to the manual you can use it with most graphics, word processing, and database packages. When I used it with *SideKick* and *XyWrite* together, the word processor promptly crashed (*SideKick* was probably the culprit). But other packages I tried had no problem coexisting with *ColorScreenPrint*.

Both interesting and surprisingly easy to use, *ColorScreenPrint* enhances graphics for many applications. And, despite its name, you don't need to have color to enjoy it.—**Jim Forney**

ColorScreenPrint
Applications Techniques Inc.
10 Lomar Park Dr.
Pepperell, MA 01463
(617) 433-5201
List Price: $79.75
Requires: 48K RAM more than the OS and resident programs, DOS 1.1 or later. For use with most IBM PC-compatible graphics printers (in conjunction with an IBM Color Graphics Adapter).

CIRCLE 699 ON READER SERVICE CARD

Marvel Print

Marvel Print is a utility package of printer enhancements designed exclusively for those Okidata Microline printers *not* fitted with the Plug 'n' Play option. The dominate philosophy behind the enhancement product is to provide IBM graphics support for an elite group of very good printers that are otherwise orphans as far as most of the available printer software is concerned.

Marvel Software's *Marvel Print* allows you to embed special codes in your text files to call up and cancel enhancements at will. You can make as many changes as you desire within a document—underlining here, emphasizing there, even changing the type size and style if you wish. The *Marvel Print* package even does proportional spacing. The program's special .BAT file is then used to send your text to the Okidata, turning the embedded codes into the appropriate printer commands in the process.

I tried *Marvel Print* both with a "shareware" word processor and with *XyWrite*, a word processor that is known for being pretty fussy about working with

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other software. Both, trial runs, however, worked just fine. Remember: you must use Marvel Print's .BAT, not your word processor's print facility, to send the file to your Okidata printer.

Marvel Print lets you create your own special fonts and graphics, although creating them can be a slow and tedious process. Character sets for the Hebrew, Russian, Arabic, and Greek languages plus a set of science and math symbols are available as an option.

I found the approximately 60 proprietary commands of this command-oriented package a little cumbersome to learn; there is no structure to the command list, and the commands themselves are not mnemonic. In actual use you would most likely narrow the 60 or so commands down to the few you use most often.

The approximately 60 proprietary commands of the Marvel Print package are a little cumbersome to learn; there is no structure to the command list, and the commands themselves are not mnemonic.

Although some of the more advanced word processors can perform many of *Marvel Print*'s functions directly without the need for intermediate software, this package offers a number of additional options. I wouldn't go so far as to call it a marvel, but it certainly does add a lot of whistles and bells to a stripped-down Microline.—**Jim Forney**

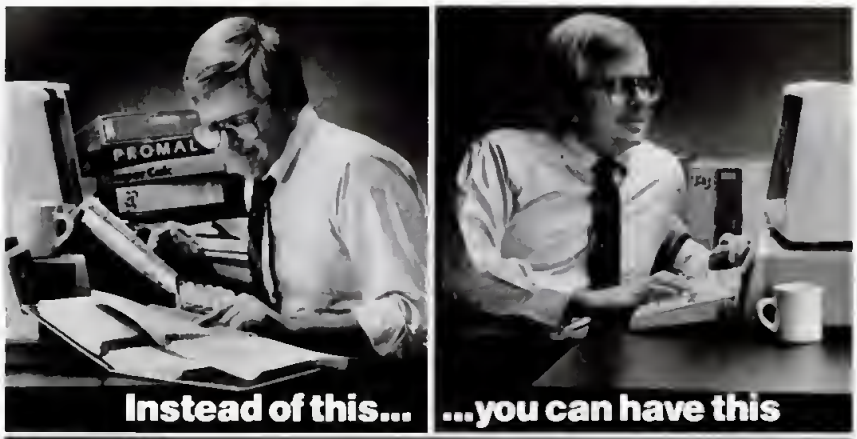
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Marvel Software
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(718) 336-2323
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Requires: 28K RAM more than the OS and resident programs, PC-DOS 1.0 or later, or MS-DOS. Compatible only with Okidata Microline printers not equipped with Plug 'n' Play option.

CIRCLE 698 ON READER SERVICE CARD

PrintStar

Aimed primarily at *WordStar* users with Epson or Okidata printers, *PrintStar* consists of four utility programs (PMODE, INSTAR, PFONT, and VPRINT) plus one file filled with numbered print samples. PMODE and INSTAR give you access to the printer's fea-

(continued on page 270)



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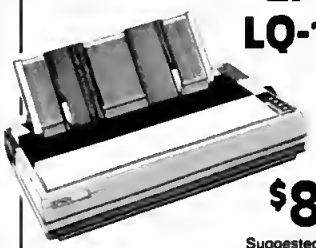
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tures, PFONT allows you to design custom fonts, and VPRINT lets you print spreadsheets sideways.

PrintStar permits you to install most, if not all, of the printer's features. Installing INSTAR redefines *WordStar*'s print enhancement menu.

If you want to print a file from DOS and still use the printer enhancements provided, PMODE allows you to transmit the features you need. The menu-selected options are automatically sent to the printer once you reenter DOS. Note: The codes remain in effect until you reinitialize or restart the printer.

VPRINT rotates any spreadsheet 90 degrees and prints it as long as it's in straight ASCII file format. If you want to use any of the printer's enhancement features, you select them by hitting P and then entering one of nine numbers. The numbers relate to the print quality shown on the sample file that comes with the program.

The PFONT program, which you can access directly or through PMODE, enables you to custom-design your own fonts. You can also use any of the seven international character sets, including the math symbols in the Greek typeface.

With PrintStar, you can custom-design your own fonts or use any of the seven international character sets, including the mathematics symbols in the Greek typeface.

Although *PrintStar*'s utility programs are adequate implementations, lack of attention to detail hinders their effectiveness. For example, you are never explicitly told that you can include 2 or more enhancements in a given print mode. In fact, while 65 print modes are available, only 8 of them (such as double-strike, condensed, and elite) appear on the screen in the PMODE program. Also, the instructions do not state which features cannot be used together. Finally, the VPRINT program does not inform you if your spreadsheet contains too many lines for the type mode chosen; instead, it simply discards the extra lines, sending them into never-never land.

The documentation doesn't help. The manual comes only on the disk; you must print it to read it since there's no option for viewing it on the screen. Also, you are forced to print out *all* eight pages, and before each page will print, you are forced to hit a key. You can't even jump ahead to print a page out of sequence.

Despite its inconveniences, *PrintStar* does let you use your printer's features

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PC TOOLS works on most IBM compatibles, requires 192K, 256K to use the memory resident feature.

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with *WordStar* at low cost. It comes in two versions: copy-protected ($49) and non-copy-protected ($79). If you don't want to spend a lot of money, *PrintStar* is probably the utility to buy, especially if you don't mind using the copy-protected version.
—Vincent Puglia

PrintStar
MicroStar Inc.
415 Pendleton Way
Oakland, CA 94621
(415) 430-9677
List Price: $49 (copy-protected version)
Requires: 128K RAM, DOS 1.0 or later. For use with Okidata Microline 192 and 193; Epson LQ-1500 and FX, LX, JX series.
CIRCLE 697 ON READER SERVICE CARD

WordStar Patcher

As its name implies, *WordStar Patcher* is aimed at *WordStar* users who would like to enhance their word processor with their printer's special features. If you are a novice programmer or have a number of different types of printers, one of which is a daisywheel, you may find the utility either educational or handy, depending on your need.

Essentially, the program patches *WordStar 3.3* with such enhancements as double-strike, italic, and compressed print. Along the way, however, *WordStar Patcher* literally takes over: it reassigns your function keys as it alters the menus and adds the print enhancements. True, you can change anything the utility does. If you are not happy with the reassignment of function keys, for example, (which you probably won't be), you can repatch the keys. You should know, however, that changing them involves writing a "script" file filled with escape sequences and hexadecimal codes. In other words, don't buy this package if you believe it will save you from reading your printer manual.

The program comes with six pages of instructions and six pages of technical notes. The instructions, although quite technical in nature, are concise and well written. The technical notes include such information as printer driver coding and explain how *WordStar* determines whether a printer is capable of microspace justification. It's amusing to find that MicroCorp also includes a glossary sheet defining, among other things, such terms as *boot*, *directory*, and *drives*—I just can't see that anyone who buys this program would need such a glossary.

Although *WordStar Patcher* requires little effort to use and gives you some printer features not easily installed by *WordStar*, I can't recommend it to novice or average users because it would require



CIRCLE 529 ON READER SERVICE CARD

them to learn escape code sequences and to write new script files to repatch *WordStar* to their liking. These users would be better off making do with as many features as they can install through *WordStar*'s own user-defined patch area. If the novice user absolutely must have italic, compressed, and double-strike type, he should look into one of the other utility programs in this roundup.

In addition to the main patch utility, the "Crayon" program allows you to select the text, menu, screen, and background colors. While this program is adequate, it is not as clean and clear as MicroPro's own color selection program.

—Vincent Puglia

WordStar Patcher
MicroCorp
P.O. Box Q
913 Walnut St.
Philadelphia, PA 19107
(215) 627-7997
List Price: $100
Requires: 96K RAM, DOS 1.0 or later. For use with all IBM PC-compatible printers.

CIRCLE 696 ON READER SERVICE CARD



CIRCLE 470 ON READER SERVICE CARD

Lettrix

If you're tired of looking at your dot matrix printer's standard output and you want to spice up your documents with some fancy typefaces, *Lettrix* belongs in your software library. It produces output that is really quite remarkable. It may not create true letter quality print, but it does produce one of the sharpest quality types any Epson this side of the LQ-1500 has ever printed.

Lettrix supports 20 fonts (including Prestige, Folio, Park Avenue, Old English, Courier, and Gothic), three foreign languages (the Hebrew font set even includes vowels), accents, and scientific printing. Since six of the typefaces include the IBM extended character set, printing graphics is possible. If you are artistically inclined or if the typefaces that come with the package do not suit your purposes, you can design your own fonts.

Lettrix can produce documents with proportional and microjustified print, super- and subscripts, and underlining and boldfacing. It offers four different type sizes, three of which are titled Wide, High, and Big. You can even mix and match them on the same line. The High size is useful for inserting an initial cap at the beginning of a story or chapter.

Lettrix's best feature is that it resides in memory. Its menu pops up whenever you hit the Scroll Lock and Return keys simultaneously. You select options with a single key. Capital letters turn features on, lower-

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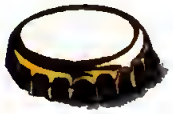


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"With Personal Consultant software," says Schreurs, "we found it far easier to teach our experts how to develop a system than teach a programmer to be an expert." In fact, the software's rapid expert system prototyping and simple debugging features enabled the two scientists to demonstrate three different expert systems in as many weeks. Schreurs produced one for training new salespeople and a second to guide repairs and maintenance for the Center's X-ray defractometer.

Pessall's makes material recommendations for tubes and support plates in steam generators.

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case letters turn them off. The program with one typeface takes up 50K of RAM, with 5K for each of up to seven additional typefaces residing in memory at any time.

Lettrix is also extremely easy to use. You can send *Lettrix* commands to the printer by way of the menu, while in DOS, or from within the text itself. To use the last method, you just precede the command with a backslash.

Even the program's documentation is a pleasure. It's only 38 pages long, with about a third filled with typefaces and examples. One especially nice touch is the special notes for users of *Word*, *XyWrite*, *MultiMate*, and *WordStar*. The notes on *WordStar* show you how to create a typeface that allows *WordStar* to print the PC's extended character set.

Lettrix requires 256K RAM and supports a plethora of mostly Epson-compatible printers.—**Vincent Puglia**

Lettrix
Hammerlab Corp.
5700 Arlington Ave.
Riverdale, NY 10471
(800) 351-4500
List Price: $98.50
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*** Symphony supports keyboard "macros."

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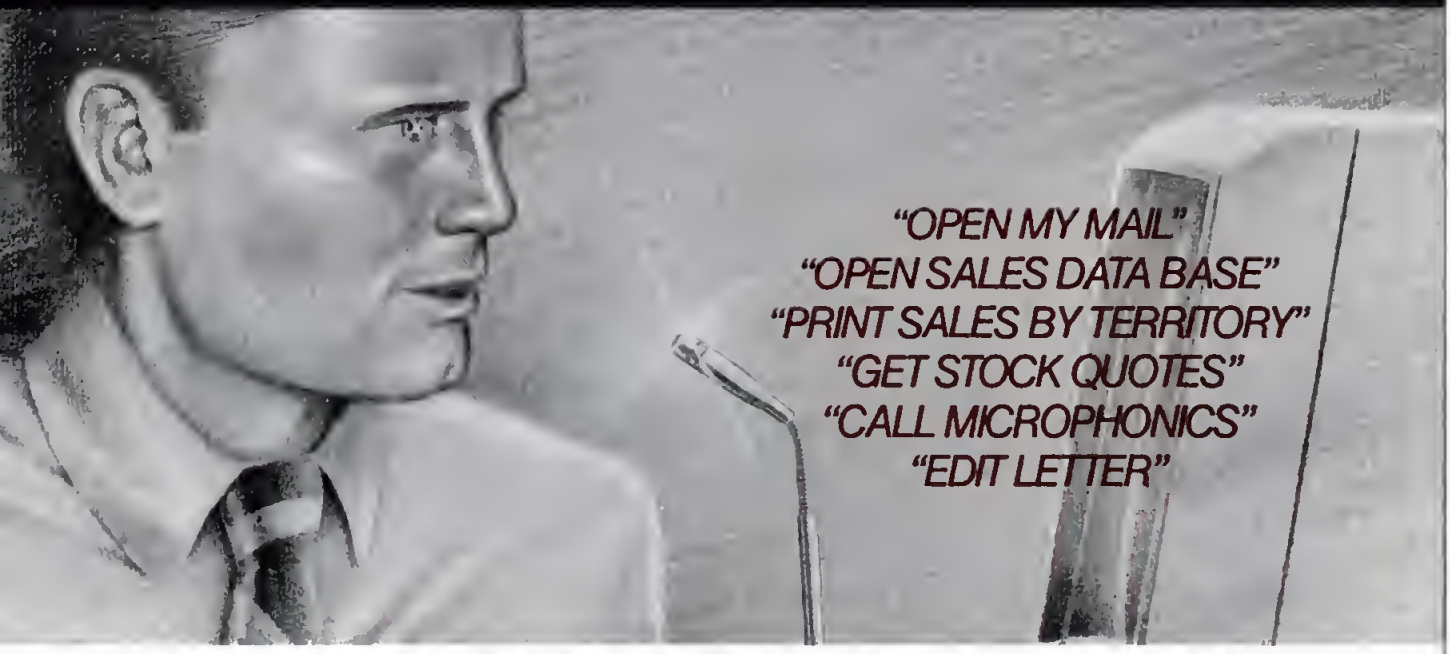
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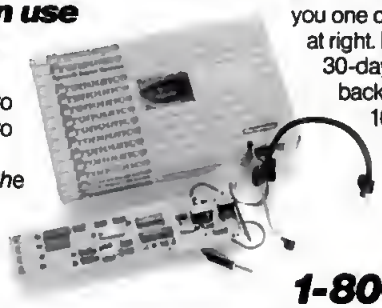
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StyleWriter™ is a unique 64K buffer with an array of type styles and sizes that upgrades your matrix printer to letter quality.

Microphonics™

CIRCLE 240 ON READER SERVICE CARD

Printer Boss

Printer Boss is a no-nonsense utility that, although limited to Epson printers, does its job very well. Its functions let you select your printer's features, download IBM graphics character sets, and print spreadsheets rotated 90 degrees. In addition, you can operate *Printer* through BASIC, and it lets you create a 32K buffer to use as a print spooler.

The entire program is foolproof to use. The menu displays all possible options for Epson printers. Depending on your particular Epson model, some of the options may be unavailable. In that case N/A appears beside the option.

With newer Epson printers, Printer Boss gives you letter quality print. It also has settings for all the usual enhancements.

An option may be unavailable if an already selected feature excludes another or if the configured machine doesn't support the capability. For example, you cannot set pica and elite at the same time, and you cannot use the vertical printing and the downloadable IBM character sets on an MX-80, since it can't handle them.

With newer Epson printers, *Printer Boss* gives you letter quality print. When you use the letter quality mode along with the buffer, however, the printer remains in that mode until you reboot DOS.

Printer Boss has settings for all the usual enhancements (boldface, underline, double-strike, elite, and compressed) as well as the ability to change line spacing, form length, and margins. These features work on all Epson printers. Sideline (the program's sideways printing option) offers five font sizes and two print modes.

If you own an Epson FX printer and you'd like a larger buffer, *Printer Boss* has a lot to offer you. If you have an MX-80, though, think twice unless all you're looking for is easy access to your printer's italic and condensed modes.

—Vincent Puglia

Printer Boss
Connecticut Software Systems Corp.
30 Wilson Ave.
Rowayton, CT 06853
(203) 838-1844
List Price: $139.95
Requires: 128K RAM, PC DOS 2.0 or later. For use with IBM PC graphics-compatible printers, including models from IBM and Epson; Okidata printers with Plug 'n' Play option.

CIRCLE 694 ON READER SERVICE CARD

Personal Print Control

Personal Print Control, part of IBM's new Personally Developed Software series, consists of two impressive programs: a print spooler and a printer controller. You must boot the programs before using an application program; they reside in memory until you reboot the system. Obviously geared to power users, these programs might be overkill for those who print only an occasional document.

The print spooler, aptly called the Personal Print Spooler (PPS), allows you to create a buffer in 1K increments up to the maximum available memory, less 32K. In other words, if your system is configured for 64K, you can still have up to a 32K buffer. The spooler's features include the ability to copy the buffer contents to disk and to print multiple copies and the option to change printer assignments without loss of buffer data. Another nice feature is that you can select a print job for direct printing, circumventing the spooler and rushing the print job ahead of any others. You control all these functions by using the Alt, Shift, and Ctrl keys combined with other keys. You even have access to the spooler commands while running other programs. The spooler can support one or two serial or parallel printers.

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CIRCLE 521 ON READER SERVICE CARD

The printer controller utility, called (of course) the Personal Printer Controller (PPC), gives you more print job management than you will probably need. To install the printer controller, the PPS must already reside in memory. Perhaps PPC's most useful function is that you can edit a document while printing it. After calling up the program and the buffer, you can scroll through the copy and mark certain sections for printing. Another nice feature is its ability to recover from a paper jam during a print job by resending the mangled part of text through the buffer.

PPC automatically suspends your application program while you are in the controller. In addition to being able to send printer control commands directly to the printer, you can define and customize your printer's specific control codes.

You transfer to the controller program by hitting the left and right Shift keys together. Up to seven windows tell you the status of the buffer and print jobs and the printer assignments and give help regarding spooler or controller commands. Unfortunately, the help screen windows work only in text mode.

The worst aspect of *Personal Print Control* is its documentation. Although you can view the documentation on screen, the process is tedious at best. Printing it all, however, can be worse. It consists of over 70 pages of almost identical-looking pages.

If you can get through the documentation, the program itself will reward you well with its impressive features.

—Vincent Puglia

Personal Print Control
IBM Entry Systems Division
1000 N.W. 51st St.
Boca Raton, FL 33432
(305) 982-2690
List Price: $29.95
Requires: 128K RAM, 192K recommended; DOS 1.1 or later. For use with all IBM PC-compatible printers.

CIRCLE 693 ON READER SERVICE CARD

PrintMan

Although *PrintMan* comes with context-sensitive, on-line help and an on-screen tutorial that you can toggle on and off at any point, the program is confusing the first few times you run through it. After that, you begin to notice that it does offer quite a few nice utilities for accessing all your printer's capabilities.

PrintMan allows you to select a variety of features including print mode, bell, downloadable characters, line spacing, print format, and sending ASCII character codes. Once you have made your selec-

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RUN/C SIGNS WITH THE PROS!

Best Selling C Interpreter Goes Major League. Now Accesses Top Libraries, Adds Debugging.

When we introduced RUN/C, the C Interpreter,™ response was immediate, enthusiastic. And why not? RUN/C knocked the stuffiness out of C, opened a door, made a great but rather intimidating language accessible and responsive — hell, fun! It was clear that you were waiting for a C interpreter, and you've since told us how much you like RUN/C's

- Familiar face. RUN/C behaves on screen like Microsoft's landmark BASIC interpreter so many have at some point used
- 500-plus page manual brimming over with C language examples.
- Ability to toggle to your favorite editor for extensive writing or editing
- A SHELL command that allows you to compile programs while in RUN/C[a].
- Close compatibility with Lattice® C's library, the top selling compiler
- Comprehensive, easy-to-master functions for peeking, poking and system interrupts.

But you also told us your needs. The biggest by far? To integrate all the great C function libraries — C Food, Halo, etc. — into RUN/C. To somehow wed an interpreter with binary libraries. So the pros among you could use RUN/C for serious applications tapping every resource at hand.

Well, frankly my dear, it wasn't easy. But the result is marvelous.

RUN/C Professional. You can bet your living on it.

The new enhanced version of RUN/C is called RUN/C Professional. Its big difference is Loadable Libraries!™

With RUN/C Professional, software developers now have a unique system for dynamically LOADing and UNLOADing multiple function libraries while in the interpreter. Simply issue the LOADLIB command, as in.

loadlib c-food

and come and get it! The full plate of C-Food Smorgasbord's functions can be called from your program as if they were built right into RUN/C! RUN/C will interpret your program, but the called library functions will whiz by at compiled code speed. How fast? Well, the famous Sieve benchmark, compiled and loaded as a library function into RUN/C Professional, runs in less than 20 seconds!

Your code can now reach for functions in any of the professional C libraries — C-Food Smorgasbord,™ Halo Graphics,™ Greenleaf Functions,™ the C Utility Library — any library which has been compiled using Lattice's large model. RUN/C's manual clearly documents how to interface a library, and how to extract only those functions you want. Important. You do need the Lattice compiler to effect these link-ups. (Ask about other compilers.)

How about your own functions? What's the difference? Once compiled into a Lattice large-model binary library, they can be set up for RUN/C integration the same way. And that leads us to a Profound Observation.

It will change the way you work.

RUN/C Pro has become a fast front end for projects of any size. Its new ability to access object code means that, as pieces of a large project are completed, you can transfer them to a compiled state in a continuous process.

Now there's no reason not to use an interpreter. Text editors, after all, tell you nothing, whereas, RUN/C talks back. It's alert, ready to go. Try things out. It shows you the results then and there, spots errors, helps get code up and running much quicker. It's superb for blasting away at a cluster of functions until indestructible and ready for the Great American Program.

Bigger Bug Killers Too!

RUN/C Professional adds a new level of built-in debugging aids to RUN/C's TRON and TRACE. They are ingeniously installed behind one of RUN/C Pro's built-in functions, so you can call for debugging conditionally.

Call the debug function with virtually any of RUN/C's commands in a string argument (eg., "LIST 400-500"), it will execute your command, then return to continue the program. Or call it anywhere in your program with the argument "break" and you'll have a menu of aids to choose from — type impromptu C statements for immediate execution, switch on single-step tracing, change variable values in the current function, and a bravura display not only of globals but values of all variables belonging to any chain of functions involved in calling the current function — even if more than one function used the same variable name!

The Pro version also enables #define's with macros, and supports standard input-output functions (stdin, stdout, stderr).

RUN/C Lite. The original Interpreter enhanced.

RUN/C Lite is the underlying C Interpreter system. For those who do not need access to compiled libraries, or the more advanced debugging tools.

It's like using IBM® BASIC with familiar commands like LOAD, MERGE, SAVE and FILES. It has a full-screen editor which allows you to insert, edit, list or delete lines on the spot. When ready to test, just say

RUN

Your program executes instantly. If an error halts it, RUN/C explains why and where. You just EDIT the offending lines of code and RUN again.

If you are already a C user, ultimately you'll want to hand your work to a compiler, for linking and for speed of execution. But you undoubtedly sense the tremendous time savings of getting out of the compiler loop at or near the beginning of program development.

RUN/C lets you develop and test code rapidly, without fussy checking. No more making things extra tidy to get-ready-for-the-compiler, where a forgotten semicolon draws 15 minutes in the penalty box. With RUN/C you can try out things devil-may-care. Let it find your typos and malaprops. It's nothing to change them and re-RUN.

How it works.

RUN/C handles the differences between the compiler and interpreter environments with great common sense. As an interpreter, it expects nothing but source, but #includes can pull in "define" and other source code files — functions you have already written, for example, or functions from commercial libraries which provide source code, like Greenleaf and BASIC_C. The #included files stay hidden. They don't bloat your listings. And they don't SAVE with the main () you're working on (for which MERGE is available).

The more you look, the more powerful this product gets. It has valuable tracking to show what's going on behind the scenes as a program executes. Switch on TRON, which displays on screen each line of source code as it executes (intermingled with what the program puts to the screen). It shows just where you were in the program when it departed for the back of beyond. Or try TRACE, which shows the current values of all variables referred to in a source line each time it is encountered. Or turn on PRON and then list a program after a run: each line appears with a number as in.

<12> printf ("something");

which says that the line was executed 12 times, a vivid picture of where to optimize for efficiency.

No end of features.

RUN/C has a SHELL command which will invoke any operating system command, with both RUN/C and your program still in memory. No need to exit and reload everything.

And finally, the EDITOR command. When RUN/C arrives, tell it the name of your favorite editor's COM or EXE file. RUN/C will thereafter load your editor in parallel so you can switch back and forth. (You'll probably need more than 256k.)

No better way to learn C.

New to C? RUN/C Lite makes a splendid teacher. Its manual has not just instructions on how to use RUN/C, but its 500-plus pages provide a thorough-going demonstration of the C language itself. Every feature of C or RUN/C is accorded its own micro-chapter. Over 100 of these chapters are devoted to RUN/C's built-in functions, and every one lists a sample program showing how it is used. These same programs are on the disk. So as you read them in the manual, you can run them on the screen, see what they do, discover why they do it, tamper with them, try things out.

It's all here. A thoroughly satisfying integration of high quality documentation, source code examples, editor, interpreter and utilities which will add both speed and pleasure to programming.

Version	Code	List	Our Price
RUN/C Lite	S0910#	$120	$109
RUN/C	Pro S0950#	$250	$225

SOME TECHNICAL NOTES

RUN/C LITE occupies nearly 180k bytes, and requires 256k of RAM. Programs up to 10,000 lines can be interpreted, although 2,000 lines is a more realistic ceiling for an interpreter. Its 100-plus built-in functions are the same as those found in most compiler libraries. So when you compile RUN/C programs, these function calls will find library counterparts. As RUN/C favors no compiler, some functions may not be present in yours, or yours may have functions RUN/C does not.

Structures, unions, initializers and #define's with arguments are supported, as well as keyboard and screen redirection from and to files. No extern definitions, and RUN/C Lite requires that all functions must be #included or MERGEd. TYPEDEF, REGISTER and function pointers are not supported as of this writing. RUN/C automatically senses and uses the 8087 and 80287 math chips.

RUN/C PROFESSIONAL requires a minimum of 320k of RAM with 512k recommended for management of multiple loaded libraries. Complete instructions for creating a LOADable library from your own source code or from commercial .LIB files created with the Lattice large model are included. The Lattice compiler is required for those wishing to create their own Loadable Library.

UPGRADES: If you bought RUN/C from PC BRAND and now want RUN/C PRO, no problem. Just call.

(a) Presumes sufficient RAM. 512k recommended for dual interpreter/compiler operations.

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The Number is...

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That's (800) 722-7263. In NY State call (212) 410-4001.

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CIRCLE 310 ON READER SERVICE CARD

Our advertisement continues on the following pages!

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GREENLEAF FUNCTIONS

More than 200 functions in *both C and assembler source*, and a 200 page manual with examples and demos

32 DOS extensions file and directory manipulation for DOS 1 1 and 2 0

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Supports ASCII or binary any parity, any word length, 8250 UARTs, all four Lattice C memory models, Hayes 300, 1200, 1200B and other modems

Has 80-page manual with each function Library and demo programs come with both C and assembler source

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If your programming still gets anywhere near the files here's our guarantee Nothing will increase your productivity faster than handing the filing job to a sophisticated file manager

Btrieve™ is the best we have seen It takes complete charge of all file indexing, reading, writing, insertion and deletion It builds 22 commands right into the language you use in the form of functions you call to tell Btrieve what to do The commands create, open, and close files, delete and insert records recapturing vacated space, find records which exactly or most nearly match keys walk files by ascending or descending key

Btrieve's foundation is a balanced-tree indexing scheme, conceded to be the fastest search technique devised (it will find any key in a million-plus item index in four or less accesses)

Btrieve comes with interfaces to C, Pascal, BASIC and COBOL, and the manual gives you working sample programs which demonstrate every command in all four languages The kind of presentation which led *PC World* to exclaim " for those of us who have endured poorly written and inadequate manuals, this one is a pleasure to read "

Btrieve has mainframe specifications! A single file may have up to 24 indexes. Segments of keys may be indexed Each index can independently accept or block duplicate keys A record length can be up to 4090 characters, an index length 255 characters A file may be 4 billion bytes It can even extend a file across two drives -- even two hard disks!

With Btrieve you are freed to think logically, the physical file is no longer of concern Gone for good is all that time-wasting dickering with intricate file referencing schemes and sorting algorithms Thinking shifts to a higher plane

Product Code S0650 Our Price
List Price **$245.00** **$199.00**

PLINK86

Size Unlimited with This Overlay Linker

Software is becoming ever more sophisticated, which means more complex programs requiring large chunks of memory But if you use extra memory to do the job, you are counting on users to have expanded RAM, and will forego sales to those who do not

Plink86™ is the answer It shoe-horns large programs into small memory First, Plink86 acts as an alternative to DOS' Link But Plink86's overlay power is what has gained it a reputation as a miracle worker It binds into the compiled program its overlay manager which knows how to swap modules of your large linked program between disk and memory, so that each can temporarily occupy the same memory space.

Unlike other linkers, the overlay manager acts on its own, needing no calls from the source program Instead, Plink86's straightforward overlay description language allows you to describe your overlay structure in one place in your program -- a structure permitting up to 4,095 overlays stacked 32 deep

Plink86 can even sub-divide its linked output into multiple files for programs which must span more than one disk

PC Tech Journal calls it "the premier linker and overlay loader that's taking over at many of the programming shops around the country"

Product Code S0500 # Our Price
List Price **$395.00** **$295.00**

CDEBUGGER

MSD's Source Level Pesticide

We've offered "symbolic" debuggers for some time They can refer to program symbols -- the names you give to variables, functions, etc. in your source programs -- so you don't have to debug C programs by way of hex memory addresses. Now along comes a true source level debugger for programs compiled with Lattice -- and at a breakthrough price.

Switch on the Cdebugger™ source display, from the beginning or at any breakpoint, and enjoy the uncanny experience of watching your source code step by, one line at a time. Or skip ahead n lines and display from there. Or browse through source from the surrounding program area -- even from another file.

Multiple breakpoints can be assigned to individual lines in your source files. Areas of memory can be set read-only to let a form of write protection help find the most elusive bugs, like pointer encroachment Trace options allow display of function names and line numbers as executed Backtrace writes a history of all functions called, a dandy roadmap of how you got lost

Other commands display and alter memory and registers, show and replace expression values. Simple variables may be referenced directly by name. (Not local names which the compiler doesn't map.)

No list of source files need be provided to Cdebugger It simply targets all *.c* files in the current directory Cdebugger supports and automatically recognizes all four memory models. Needs 256K.

Product Code S1100 # Our Price
List Price **$165.00** **$145.00**

BASIC_C

Use Your Knowledge of BASIC to Learn C

If you're getting the message that switching from BASIC to C would be prudent, you're about to discover that it's back to basics of a different sort BASIC is fat with hidden functions that stripped down C just doesn't have

Gone are all those handy string manipulators like LEFT$ MID$ STRING$ etc In C when you reach for even simple invocations like INPUT or PRINT -- well, underlying such expressions in BASIC are bulging macros which C cannot have if it is to keep its slim profile.

But now comes BASIC_C and all your old favorites are back Over 80 routines to open and close files, field and perform conversions on file buffers, peek and poke, print using, clear screen, "instr", on error goto they're all there Some have reworked names and syntax to suit C, but all are written as one-to-one functional equivalents to the familiar features of BASIC And they are documented one to a page in alphabetical sequence like the Microsoft manual for added familiarity Plus a first rate chapter comparing how BASIC and C go about their tasks.

So with BASIC-C when you're thinking INPUT, go ahead Use it Or LPRINT or LOCATE or INKEY But without BASIC_C, you will find that every line of code plunges you back in the C texts to figure out how to write it Someday you'll want to, but for now, BASIC_C will start you programming quickly at the statement level so that you can concentrate on C's larger concepts.

Product Code S0350 # Our Price
List Price **$175.00** **$145.00**

BASTOC

Translates BASIC to C

You'd like to upgrade C, but what to do with that warehouse of BASIC routines you've carefully polished over the years? And how to face converting your famous Leviathan accounting system from BASIC, much less your Labyrinth file management package?

With BASTOC,™ a translator which takes in BASIC source code and emits pure Kernighan & Ritchie C Our BASTOC understands Microsoft Extended BASIC (except for dynamic dimensioning and common) It will optionally convert your program into a single monolithic C function or will decompose it into separate functions, one for each GOSUB label.

Strings are dynamically allocated in the target program, ridding your application of BASIC's catatonic halts for garbage collection. BASTOC will try to create structure of even the most convoluted BASIC code, and writes any indigestible statement into the C output as a comment plus explanation Also, you optionally can tell BASTOC to insert BASIC source lines into the C target as comments.

Source code of several modules of the translator and library are provided so you can tailor BASTOC to your environment if needed And source of the entire product is for sale.

Product Code S0370# Our Price
List Price **$350.00** **$295.00**

PANEL

Adds 3rd Dimension

The newest version of this premier programming tool lets you layer your screen designs with up to ten overlapping images, making it easy to background a screen with pop-up lists, help boxes, and alternate sets of input fields.

Writing your own screenware is a good way to blow completion dates and profits. Panel™ works with you interactively to set up foolproof screen displays and data entry forms rapidly It tests your form to prove that it (and test data) behave correctly, then converts the finished work into C source code for incorporation into your application, and compilation with Lattice.

Wonderfully diverse attributes may be selected for any field -- size, data type, color, of course, but also conversion of input to upper case, clearance of existing data when new antry is started, masks for standard formats (eg , dates, phone numbers); a choice of styles for numeric fields, phrases which fill in when their first letter is typed, multiple-choice lists from which to choose a field fill-in by cursoring a highlighted bar Fields may be multi-lined (eg , name and address as one field) and scrolled if larger than the screen space allotted them

Panel builds in a user interface for keystroke movement within and between fields, and supplies extensive validation routines for checking user field entries -- in source code, so you can tack on your own unique variants.

Panel's screen layouts can be assigned to individual windows under Lattice Window control. Screen designs may be dynamically loaded from file, or compiled into a program, and version 6 has optimized code to quicken display speed.

The whole package is wrapped in a monitor and keyboard customization package to tailor* your application for other equipment.

Panel A superior productivity tool now bigger than ever

Product Code S0400 #* Our Price
List Price **$295.00** **$250.00**

*"Tailor" needs separate license to distribute with your programs

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HIGH SPEED SOLUTIONS FOR APPLICATIONS DEVELOPMENT

MULTI-HALO

MORE BOARDS!

Premier Graphics Library Now Supports 21 Boards

Halo has become so dominant a graphics standard that the newest incarnation, Multi-Halo, supports 21 graphics cards, and comes with a multitude of mouse and printer drivers. All with one purchase, replacing the previous one board per copy. The latest version adds support for the AT&T 6300 and the IBM enhanced graphics card.

Within your Lattice program a function call can reset drivers. You can arrange that your application program doesn't care what board the customer has, you can even switch boards within a program, as when two different monitors are used.

Halo is a complete library of graphic functions which can be linked with your Lattice programs to create full-color charts, graphs, simulations, animation.

Over 100 commands are at your disposal, including plot, line, arc, box, circle, plus single commands to produce bar graphs and pie charts. Pattern-fill and dithering commands give your graphics impressive texture and color mixes, rubber-banding draws shapes for interactive users, area moves produce animation, fill and flood commands paint areas. Multi-Halo allows you to define your own world coordinate scheme, divide the screen into windows, and scale graphic figures automatically. Requires 256K.

Product Code S0650 Our Price
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Dr. HALO II

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BetterBASIC is big: its hugely expanded features require 192k, your programs can go all the way to the PC's full 640k. It is comfortable, it behaves like Microsoft BASIC at the interactive level, with a full-screen editor, direct statement execution, and always poised to RUN. But it is fast. BetterBASIC is not an interpreter. It is an incremental compiler: each line you type is compiled (and error-checked) when entered, not re-interpreted over and over at run time. So the classic Sieve benchmark runs over *16 times faster* than Microsoft BASIC can manage.

BetterBASIC indents automatically for logical, readable listings, and is salted with statements to encourage structure. Loop structures like FOR, WHILE are treated as sealed-off logical blocks. They safeguard against typical BASIC bedlam by not permitting GOTOs in or out.

BetterBASIC adds the renowned pointers of C. Variables defined as pointers store addresses of other variables of the same type assigned to them, such as arrays or strings. Use pointers to directly load new data into the addresses at much higher speed.

If you know C, you never thought BASIC would ever have structures, but here they are. A structure gathers variables of different types into a record which is given a name. Arrays of such structures may be defined to accommodate data for multiple records. The structure name is all that is needed for file reads and writes, leading to the unmourned demise of FIELD, MKI$, etc., CVD, etc., LSET, RSET. Are you listening Microsoft users? They, and the Babel of redundant variables they needed are, GONE!

BetterBASIC has "procedures". They take the place of BASIC subroutines. Set up in their own work space and edited separately on the screen, procedures cannot run afoul of main program code. They are summoned by name, not (as in GOSUBs) by line number, and variables declared within them cannot be affected by the main program or other procedures unless deliberately passed back and forth.

Best of all, once you have sturdy procedures which can be relied on never to fail, store them in compiled modules. Have BetterBASIC fold in such modules at load time, so they are generally available to your coding, just like PRINT or INPUT. So what have we here? That's right, an extensible language to which you can add your own commands!

There's lots more than fits here. Ask about a runtime module to build COM and EXE files, and a Btrieve interface.

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Lattice C has been the standard-bearer compiler for years. Peter Norton in *PC Magazine* (1/8/85) said, "best for systems programming: tight code, total control of what's going on, noticeably better than any of its competitors." After reviewing nine compilers for the PC, the *PC Tech Journal* unequivocally declared Lattice C "best for software development: it compiles fast and produces fast programs."

When Lattice C appeared, there was nothing comparable. Ever since, software developers have created exceptional tools and function libraries to marry into Lattice. Programmers now have an enormous resource of libraries and utilities to speed their work. That's a vital consideration in choosing a compiler. Better check whether the latest geewhiz may have only gewgaws to go with it.

Lattice C runs on virtually any computer using an 8088 or 8086 chip, and generates code which optimizes use of the 8087 chip, if present. Create your source files with any word processor or text editor and Lattice C will compile them into Intel 8086 object module format for linking to other modules by DOS's Link or our Plink86.

Lattice C offers a choice of four memory modules between 64K and RAM capacity for program and data to allow you to choose the right combination of small memory efficiency and large memory addressability. It is a full implementation of Kernighan and Ritchie (K&R), with 39 character variable names, nested comments, transcendental and Unix math functions. K&R didn't think to mention, and some of Unix's most useful options such as "fork", to pull a second program into memory alongside the first.

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MARK WILLIAMS C SYSTEM

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Mark Williams thinks you shouldn't be marooned in space. Their C Programming System™ expands the universe with a source code level debugger which comes with their compiler, so you can watch your own friendly code, not hexadecimal flotsam, float by a window as it executes, with your program's screen output in another window.

You can set tracepoints to stop execution on source lines or when variables change, log functions called to chart the course your program took; change local variables to test different outcomes.

The compiler itself has long been a bright star. It is a full K&R implementation and then some, with enumerated and void data types, structure assignments, and Berkeley rules — fully UNIX compatible. It boasts small and large memory models, 8087 support, ROMable code, DOS calls and the fattest compiler library around. Extensive optimization lets this compiler claim the tightest code and fastest execution of all the compiler luminaries, especially with the large model. User comments confirm it, and so do reviewers: "Has the most professional feel of any package we tested," *Byte* (8/83). "Of all the compilers reviewed, ... first choice for product development," *PC World* (8/84).

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tions, you can save the options to disk and use them within batch files, BASIC programs, or directly in DOS.

PrintMan also contains a context-switching utility that lets you exit to DOS and use DOS commands. Perhaps its best aspect is a text entry feature for writing headings or short documents and printing them immediately without having to boot up a word processing system. If your document does not fit within the 15 lines the utility permits, you can create more text areas and have them print sequentially.

You should be aware of some distressing aspects, though. Although the type wraps around, you have no true margins. As a result, lines print out past the 80-column mark. There is also a bug: Printing more than what's allowed in the small entry area causes the last line to overwrite onto the first "available options" line. The overwriting remains even after you send the text to the printer, and the only way to get rid of it is to reboot the program.

If the program has any major drawback, it's the interface. In its attempt to make the program user-friendly, Qualitas may have taken things a little too far. *PrintMan* has so many pop-up menus that it begins to resemble a shooting gallery. True, the new menu doesn't completely hide the screen beneath it; ideally, however, you should not have to go through all the intervening menus to tell the program you want to take an action.

—Vincent Puglia ■

PrintMan contains a context-switching utility that lets you exit to DOS and use DOS commands. Perhaps its best aspect is a text entry feature for printing headings or short documents immediately.

PrintMan
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Bethesda, MD 20817
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Jim Forney, Charles Petzold, Alfred Poor, and Vincent Puglia are all frequent contributors to PC Magazine.

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CIRCLE 202 ON READER SERVICE CARD

Green Screen 1-2-3 Graphics

Now PC users with monochrome displays can get 1-2-3 to draw bar and stacked-bar graphs without auxiliary boards or code changes.

1985/No. 25

The F10 key can do wonderful things in Lotus's *1-2-3*—if you have a color adapter and display or a Hercules (or equivalent) board. After a few simple steps to define an *x*-axis and some data ranges, F10 turns your numbers into a graph on the screen. If you have two displays, you can even simultaneously view the worksheet on your monochrome and the graph on your color display. Change a number, press F10, and *1-2-3* redraws the updated graph.

For the many PC owners with only the IBM monochrome adapter and display, however, the F10 key is worse than useless. Not only does it produce no graphs, it just derisively beeps at you instead. Humiliating.

To be sure, you can still *print* graphs. I remember the first Lotus graph I printed without previewing, however. It was a bar graph that came out with perfect headings and legends—but no bars. My mistake, of course, but it took 20 minutes to print.

Now, however, as Figure 1 shows, there is a way to get *1-2-3* to display bar charts on your green screen monitor. MONOGRAF.DRV is not a patch but, rather, a driver program designed to be used in conjunction with *1-2-3*, Version 1A. The driver I have written does not alter or change your *1-2-3* program in any way, nor does it use any code from Lotus's own

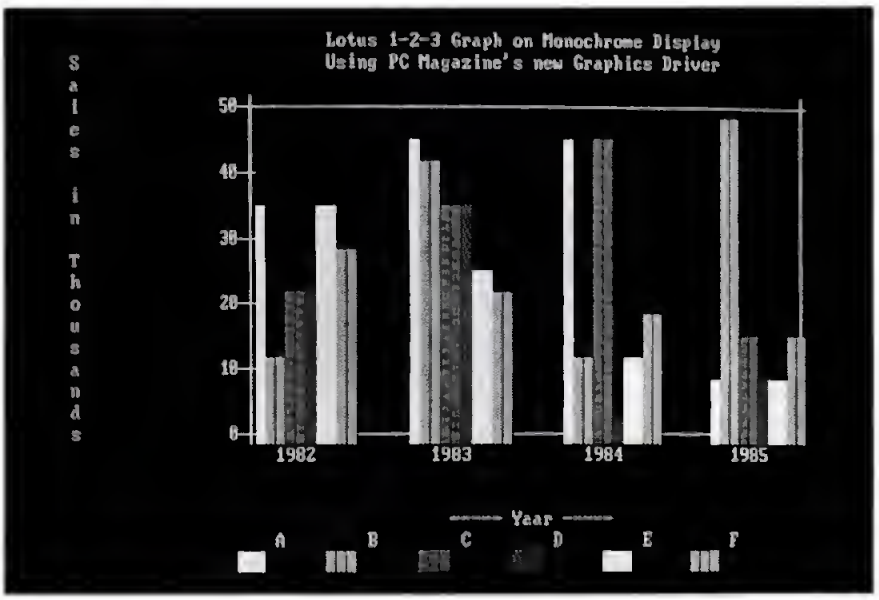


Figure 1: *A monochrome 1-2-3 bar chart displayed by using MONOGRAF.DRV.*

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drivers. It simply provides a means for Lotus to display graphs on the monochrome display. [*Editor's note: Just as you're properly concerned about observing Lotus's rights, remember that while you are free to make archival copies of MONOGRAF.DRV for your personal use, the program is Copyright 1985 Ziff-Davis Publishing Company. The program may not be sold or included with other software that is sold, and it may not be published elsewhere (including placement on a computer bulletin board), save by permission of Ziff-Davis Publishing Company.*]

Lotus Graphics on Your System

If you have a modem, you can get MONOGRAF by calling the PC Interactive Reader Service at (212) 696-0360. If your communications software supports the Xmodem protocol, you can download MONOGRAF.DRV directly. If not, download MONOGRAF.ASC instead. Rename it MONOGRAF.BAS, load it into BASICA, and run it. This will create the MONOGRAF.DRV file.

If you don't have a modem, you can simply type in the MONOGRAF.BAS program shown in Figure 2. Running this once in BASICA will create the MONOGRAF.DRV file. Use the same line numbers I've used so that if you make a typing error on one of the lines, the program will tell you. If all the lines are OK, but you still get the message "MONOGRAF.DRV file is not valid," you probably skipped a line or typed one in twice.

If you have the IBM or Microsoft Macro Assembler, or if you'd like to follow the explanation below in detail, you'll want either to download the assembly language listing, MONOGRAF.ASM, from PC-IRS or to send a self-addressed, stamped envelope and request to Technical Editor, *PC Magazine*, One Park Ave., New York, NY 10016. Using the assembler, you create MONOGRAF.DRV with the following commands:

```
MASM MONOGRAF;
LINK MONOGRAF;
EXE2BIN MONOGRAF MONOGRAF.DRV
```

Ignore the LINK message that complains about the absence of a stack segment, and note that you use a .DRV extension for the file converted by EXE2BIN.

```
100 REM -- BASIC PROGRAM TO CREATE MONOGRAF.DRV
110 OPEN "MONOGRAF.DRV" AS #1 LEN = 1
120 FIELD #1,1 AS A$
130 CHECKSUM = 0
140 FOR I% = 1 TO  66
150    LINESUM% = 0
160    FOR J% = 1 TO 8
170       READ BYTE%
180       CHECKSUM = CHECKSUM + BYTE%
190       LINESUM% = LINESUM% + BYTE%
200       LSET A$ = CHR$(BYTE%)
210       PUT #1
220    NEXT J%
230    READ LINECHECK%
240    IF LINECHECK% <> LINESUM% THEN PRINT "Error in Line";299 + I%
250 NEXT I%
260 CLOSE
270 IF CHECKSUM = 54232 THEN PRINT "Successful Completion!" : END
280 PRINT "MONOGRAF.DRV file is not valid!" : END
300 DATA     16,     2,     1,     0,     1,     0,   110,     0,   130
301 DATA      0,     0,     0,     0,     0,     0,     0,     0,     0
302 DATA      0,     0,     0,     0,     0,     0,     0,     0,     0
303 DATA     77,   111,   110,   111,    99,   104,   114,   111,   837
304 DATA    109,   101,    32,    71,   114,    97,   112,   104,   740
305 DATA    105,    99,   115,    32,    40,    67,    41,    32,   531
306 DATA     67,   104,    97,   114,   108,   101,   115,    32,   738
307 DATA     80,   101,   116,   122,   111,   108,   100,    44,   782
308 DATA     63,     1,   199,     0,    10,     0,     7,     0,   280
309 DATA      6,     0,    10,     0,     7,     0,     6,     0,    29
310 DATA      0,     1,   255,   233,   102,     0,   233,   196,  1100
311 DATA      0,   233,   203,     0,   233,   204,     0,   235,  1108
312 DATA     13,   144,   233,    24,     1,   233,   107,     1,   756
313 DATA    235,     4,   144,   235,     1,   144,   184,     0,   947
314 DATA      0,    11,   192,   203,     0,     0,     0,     0,   406
315 DATA      0,     0,     0,   176,     0,     7,   219,   219,   621
316 DATA    178,   177,   176,   219,   170,     0,     0,     0,   928
317 DATA      0,     0,    46,   199,     6,   133,     0,     4,   388
318 DATA      0,    46,   198,     6,   135,     0,     8,    46,   439
319 DATA    199,     6,   136,     0,   200,     0,   235,    20,   796
320 DATA     46,   199,     6,   133,     0,     2,     0,    46,   432
321 DATA    198,     6,   135,     0,     4,    46,   199,     6,   594
322 DATA    136,     0,    64,     1,    46,    59,     6,   136,   440
323 DATA      0,   114,    16,   124,     7,    46,    43,     6,   356
324 DATA    136,     0,   235,   240,    46,     3,     6,   136,   802
325 DATA      0,   235,   233,    46,     3,     6,   133,     0,   656
326 DATA     46,   246,    54,   135,     0,   152,    46,   199,   878
327 DATA      6,   133,     0,     0,     0,   195,    80,    82,   496
328 DATA    184,    80,     0,   247,   226,     3,   193,     3,   936
329 DATA    192,    46,   163,   120,     0,    90,    88,   195,   894
330 DATA     80,   139,   194,   232,   155,   255,   139,   200,  1402
331 DATA     46,   163,   116,     0,   139,   193,   232,   166,  1085
332 DATA    255,   139,   200,    46,   163,   118,     0,   232,  1153
333 DATA    212,   255,    88,   195,   184,     0,   176,   142,  1252
334 DATA    192,    43,   255,   185,   200,     7,   184,    32,  1106
335 DATA      7,   252,   243,   171,   203,   187,   126,     0,  1189
```

(Figure 2 continues)

Figure 2: *The BASIC program to create MONOGRAF.DRV.*

Installing MONOGRAF.DRV

By whichever method you acquire MONOGRAF.DRV, the final step is to copy it to your *1-2-3* system disk (or subdirectory) renaming it in the process. You do this with the command

```
COPY MONOGRAF.DRV [drive:][path] GD.DRV
```

where [*drive:*] and [*path*] specify your Lotus system disk or subdirectory path.

Creating Your Graphs

If you've not previously worked with *1-2-3*'s graphics facilities, you're ready to go back to the Lotus tutorial or manual and find out how to do it. It's a lot easier than you probably imagine. However, there are some limitations on what you can do on the monochrome display with the MONOGRAF driver program:

1. You should select only Bar and Stacked-Bar graphs. Any other type of graph will be incomplete and will probably look like garbage.

2. You should specify Color instead of Black-and-White from the graph options menu. While this sounds counterintuitive, the Black-and-White option creates crosshatch patterns in the bars that cannot be duplicated on the monochrome display. With the Color option, the bars are displayed with blocks of different dot densities.



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```
336 DATA    46,   215,    46,   162,   124,     0,   203,   232,  1020
337 DATA   198,   255,   203,    46,   196,    62,   120,     0,  1080
338 DATA    46,   161,   110,     0,    46,   139,    30,   116,   656
339 DATA     0,   232,   180,   255,    59,   193,   116,    17,  1052
340 DATA    59,   210,   117,    55,    43,   200,   187,     2,   881
341 DATA     0,   176,   196,   180,   179,   115,    19,   235,  1100
342 DATA    13,   139,   202,    43,   203,   167,   160,     0,   947
343 DATA   176,   179,   180,   196,   115,     4,   247,   219,  1316
344 DATA   247,   217,    65,    38,   128,    61,   197,   116,  1069
345 DATA    14,    38,    56,    37,   117,     6,    30,   198,   504
346 DATA     5,   197,   235,     3,    38,   136,     5,     3,   622
347 DATA   251,   226,   232,   203,     0,    83,     3,   219,  1217
348 DATA    46,   136,    30,   124;     1,    10,   192,   116,   663
349 DATA    25,   254,   200,   116,    19,   254,   200,   116,  1184
350 DATA    11,   254,   200,   116,     5,   104,     4,     0,   774
351 DATA   235,    11,     3,   219,    43,   192,   235,     5,   943
352 DATA    43,   219,   184,     2,     0,    46,   128,    62,   684
353 DATA   124,     1,     0,   116,    11,    43,   211,    43,   549
354 DATA   211,    43,   200,   184,   159,     0,   235,     9,  1041
355 DATA    43,   200,    43,   200,    43,   203,   184,     1,   933
356 DATA     0,   232,    44,   255,    46,   196,    62,   120,   955
357 DATA     0,   252,    69,   227,     5,   164,     3,   248,   988
358 DATA   226,   251,   203,   232,   202,   254,   145,   232,  1745
359 DATA   198,   254,    59,   193,   116,    48,   119,     1,   988
360 DATA   145,   147,   232,   165,   254,   146,   232,   161,  1482
361 DATA   254,    59,   194,   116,    33,   119,     1,   146,   922
362 DATA    81,    83,   232,   233,   254,    46,   196,    62,  1187
363 DATA   120,     0,    46,   255,    54,   124,     0,    30,   637
364 DATA   143,     5,    65,    59,   200,   114,   235,    91,   915
365 DATA    89,    66,    59,   200,   114,   226,   203,     0,   965
```

(Figure 2 ends)

3. Don't go overboard with the data. A bar can be no thinner than one character, so if you try to create too many bars, some of them will not be visible. The practical limit is about 40 bars.

4. You cannot display the graph again in *1-2-3*'s PrintGraph program by pressing the F10 key there. You can view the graph only while using the *1-2-3* worksheet.

These are not severe rules, and they are certainly less restrictive than the rule monochrome display users now live with—the one that says "You may not display graphs. Period."

1-2-3's Drivers

When you first installed Lotus, you ran a batch file that copied and renamed some files with the extension DRV to the *1-2-3* system disk or hard disk subdirectory. These files with the DRV extension are called *drivers*. The drivers provide a link between the actual *1-2-3* program and the computer's hardware: the display, the keyboard, and the printer.

When you run Lotus, the following driver files must be on the disk (or subdirectory) from which you load *1-2-3*:

TD.DRV—the text display driver
KB.DRV—the keyboard driver
PR.DRV—the printer driver

If you are equipped with a color/graphics display (or a Hercules adapter or something equivalent), you should also have a file called GD.DRV—the graphics display driver. Without a GD.DRV file, *1-2-3* cannot and will not display graphics, and F10 will beep at you.

The Lotus package includes drivers for several hardware configurations. To display nongraphics text on the screen, for example, the IBM Lotus package includes IBM0MONO.DRV (monochrome display), IBM0B&W.DRV (graphics adapter connected to a black-and-white display), IBM0COLO.DRV (graphics adapter and color display), and IBM0HERC.DRV (Hercules adapter and monochrome display). Depending on the hardware in your system, the installation procedure copies one of these files to a file called TD.DRV, which is what the program uses to show text on your monitor.

1-2-3 uses these drivers for most of the machine-dependent input and output functions. That is, *1-2-3* just "tells" the appropriate driver what it wants to do; the driver actually goes about the multistep chore of printing a character to the display or reading a keystroke from the keyboard or whatever. Isolating all the hardware-dependent code makes it easier for the software developers to adapt their programs for machines not entirely compatible with the PC. Everything that makes the noncompatibles noncompatible can be taken care of within the drivers and not the actual program.

The use of drivers for hardware-dependent chores is almost universal in large PC programs, even if they are integrated into the program itself and not placed in separate files. In the case of *1-2-3*, the separation of the drivers into discrete files makes it all the easier for us to simply add a GD.DRV graphics-driver file of our own to the regular collection of drivers Lotus normally uses. Thus, when *1-2-3* loads, it will find the GD.DRV driver file and use it to display graphics.

The GD.DRV file copied from MONOGRAF.DRV interprets all of the *1-2-3* graphics commands and attempts to convert them into something reasonable on the monochrome display. When *1-2-3* instructs the new GD.DRV driver to print straight lines or blocks or text on the display, the driver interprets these instructions and does the best it can. It will ignore requests to print dots, or lines that are not exactly horizontal or vertical. That is why MONOGRAF.DRV will produce either junk or nothing at all if line or pie graphs are chosen.

Inside the Drivers

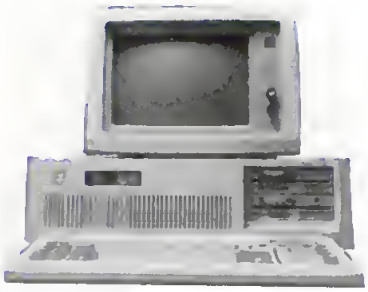
You can see the general structure of a Lotus driver file by downloading the MONOGRAF.ASM file and printing it out, or by inspecting some of *1-2-3*'s own graphics drivers (IBM1G1.DRV, IBM1G2.DRV, or IBM1HERC.DRV). If you look at a .DRV file under DEBUG, however, you should add 10h (hexadecimal) to the CS and DS registers. The reason for this is that DEBUG loads files starting at offset 100h. Since the drivers are set up to begin at offset 0, you must adjust the segment registers to list the addresses accurately.

The beginning of each driver contains four words of header information. These are the number of bytes in the driver, the type of driver (a 1 means graphics display), the Lotus version number (in this case another 1), and the address of an initialization routine.

At offset 18h is a text string identifying the driver. The information *1-2-3* will need on a regular basis begins at offset 40h. In some drivers, this area contains information about the device, followed by a series of JMP instructions. In other drivers, the JMPs start immediately at 40h. The JMP instructions within the driver branch to

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various routines that do specified functions.

For Lotus graphics drivers, the most important information stored at 40h is the maximum column and row values. In our MONOGRAF driver, we want to trick Lotus into believing it's dealing with a regular 320-column by 200-row dot display.

Beginning at offset 53h in a graphics driver like MONOGRAF are nine 3-byte JMP instructions. Each of these jumps goes to a subroutine that terminates with a far return. This implies that *1-2-3* is using the driver by calling the address 53h, 56h, 59h, etc., with far calls. (A far call is one in which the segment address changes as well as the offset.) Each of these nine entry points beginning at offset 53h performs a certain function required to draw a graph. By looking at these functions, you will see how MONOGRAF works.

The call to offset 53h clears the screen. The MONOGRAF driver just writes blanks to the monochrome display. The next call (to offset 56h) specifies a color in register AL (ranging from 0 to 6) for use in future calls. Color 0 is for background and the others represent the six data ranges available in Lotus. MONOGRAF translates these six colors into one of four possible block characters available on the monochrome display. The call at offset 59h sets a row-and-column address (in registers DX and CX) for future calls. MONOGRAF translates this address (up to 200-dot rows and 320-dot columns) into an approximate character position (25 rows and 80 columns).

A call to offset 5Ch means that *1-2-3* wants the driver to draw a line from the point previously specified to the row and column in registers DX and CX. MONOGRAF does something only if the line is horizontal or vertical and ignores the request if it isn't. It can draw a horizontal or vertical line by using the line-character symbols available on the monochrome display. These lines draw the box and tick marks of the graph. (Nonvertical and nonhorizontal lines would normally be used for line and pie graphs, which MONOGRAF cannot handle.)

The call to offset 5Fh requests the driver to write a dot to the display. There's just no way we're going to do that on the monochrome display, so MONOGRAF ignores the request. (*1-2-3*'s PrintGraph facility works predominantly with dots, so that is why you won't see much if you display a graph there.)

The next call is a request to write a character to the display. The logic in MONOGRAF is much simpler than that in the Lotus graphics drivers. The latter contain dot patterns of all the characters so the driver can write text horizontally or vertically. By contrast, MONOGRAF converts the dot position to a character position and writes out the character.

When *1-2-3* calls offset 65h, it wants the driver, using the color specified earlier, to draw a filled-in block on the display. For this call, MONOGRAF converts the addresses and writes the appropriately shaded block characters to the display. Thus, this call draws the bars in bar graphs.

The last two calls are ignored. These are to read a dot (which MONOGRAF can't do since it hasn't written a dot) and to reset the display, which is unnecessary.

In the Interim

You'll eventually be buying a color/graphics display. You know that. So many new programs are taking advantage of color and bit-mapped graphics that the standard monochrome adapter and display will eventually seem inadequate. You may be considering the IBM Enhanced Graphics Adapter (EGA) and Display to get the resolution of the monochrome with color and graphics. But *1-2-3* cannot even be used on the EGA, except with the PC*jr* graphics driver (see "Shortcut Allows Lotus Use on EGA," *PC Magazine*, Volume 4 Number 19, p. 38).

In the interim, however, the MONOGRAF monochrome graphics driver can make *1-2-3* a more useful and productive program for you. I'd be the last to suggest that it represents the last word in computer graphics. The display is too limited for anything really precise, and my program works only for bar or stacked-bar charts. You'll probably want to print the graph with Lotus's normal PrintGraph facility before showing it to anyone. But notwithstanding all these caveats, it's a whole lot better than getting beeped at. ■

Charles Petzold is a contributing editor of PC Magazine.

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On Menus and Memory

I've got two tips for *1-2-3* users. First: if you write *1-2-3* menus with the /XM command, you will find that many people back out of them by hitting Escape. That works fine with *1-2-3*'s own menus, but not always with the ones you build yourself. When *1-2-3* is processing a macro-written menu, hitting Escape just makes the macro processor move on to the next cell in the macro. For this reason, the two sample menu macros in Figure 1 will run differently, even though the blank space in cell D14 is the only difference between them.

If you run the first macro and then hit Escape to get out of the menu, the macro processor will go on and read cells D6, D7, and D8, even though they are text for the menu rather than macro commands. Because of the carriage return in cell D8, the macro will write that text into whatever cell the cursor happens to be on. If that cell had something important in it, it would be gone.

If you run the second macro and hit Escape to get out, you'll return smoothly to the ready state. This is because the macro processor finds a blank cell at D14 and terminates the macro.

A second tip: Figure 2 shows two different formulas that do the same thing. You will use less memory and disk space if you use the formula with the @sum function. I suspect that this is because *1-2-3* knows that the operator is + for every cell in the second formula, whereas it must use memory and disk space to record each separate operator in the first formula.

Patrick McMahon
Aurora, Colorado

The 1-2-3 manual clearly explains that hitting Escape when in a macro-built menu will make the macro keep executing from the cell below the /XM command. Since the /XM command includes the address of the cell where the menu text begins, the text doesn't have to be right under the /XM command and thus directly in the path of the macro. A common solution to the problem raised by Mr. McMahon is to keep menu texts in a column away from the macro. This allows you to include macro commands below the /XM command that will continue to execute if the user refuses to make a menu choice and hits Escape instead. Mr. McMahon's solution also works well, however, and it has the advantage of keeping the menu text close to the /XM command. This is handy when you're debugging or modifying a macro.

```
     D                          E                          F
-------------------------------------------------------------------
 3
 4                          ** First Menu **
 5   /xmD6~
 6   Income                 Balance                    Quit
 7   Print income statement Print balance sheet        Return to ready mode
 8   /ppcrrINCOME~q         /ppcrrBALANCE~q
 9
10
11
12                          ** Second Menu **
13   /xmD15~
14
15   Income                 Balance                    Quit
16   Print income statement Print balance sheet        Return to ready mode
17   /ppcrrINCOME~q         /ppcrrBALANCE~q
```

Figure 1: *Two menu macros. The second will send the user cleanly back to ready mode if he hits Escape.*

```
+A1+B5+C8+F9+H17+I15+P46+Q55+AA15+AB28+BG67+BA15+CB45+N47+I16

@sum(A1,B5,C8,F9,H17,I15,P46,Q55,AA15,AB28,BG67,BA15,CB45,N47,I16)
```

Figure 2: *Two different formulas that do the same thing as Figure 1. The second is slightly more memory efficient.*

In order to test Mr. McMahon's second tip, I built a large spreadsheet in which I included the two different formulas, which appear exactly as submitted. The @sum formula took up 98 bytes of memory, whereas the + formula took up 110 bytes—which constituted a savings of 12 bytes. Both formulas, however, increased the spreadsheet's disk space by exactly the same amount: 128 bytes.

Selective Addition

I have written a *Symphony* macro that adds only selected figures from within a column. In the expense analysis shown in Figure 3 (lines 5 to 22), the account num-

```
          C            D       E
-----------------------------------------
 5   EXPENSE ANALYSIS
 6
 7   Account Number              Expense
 8   & Description               Amount
 9   ======================      ==========
10   0000 EQUIPMENT                $4,000.00
11   0012 Depreciation             $4,000.00
12   1000 PAYROLL EXPENSE          $3,000.00
13   1011 Salaried Labor           $1,500.00
14   1014 Hourly Labor             $1,500.00
15   2000 UTILITIES EXPENSE        $2,000.00
16   2045 Gasoline                 $1,000.00
17   2089 Electricity              $1,000.00
18   3000 SUPPLIES                 $1,000.00
19   3021 Steel Wool                 $500.00
20   3001 Spray wax                  $500.00
21                                 ----------
22   Total Expenses               $10,000.00
23
24
25
26   {GOTO}C10~                                  Goto first item in column
27   {BLANK E22}                                 Erase expense total
28   {FOR COUNTER,1,10,1,TWO}                    Set for-next loop
29   {MENU}C~J23~                                Copy item to J23 work space
30   {RIGHT}{RIGHT}{MENU}C~J24~                  Copy expense to J24 work space
31   {IF @MID(+$J$23,2,2)<>"00"}{BRANCH THREE}   Test for "00" ending
32   {LET E22,+E22+J24:VALUE}                    Add to total
33   {LEFT}{LEFT}                                Go to
34   {DOWN}                                         next item
35
36   "TWO" = C29
37   "THREE" = C33
```

Figure 3: *A* Symphony *macro that totals expenses only for items with account numbers ending in "00."*

```
{GOTO}C10~
/rncCOLUMN~{BS}.{END}{DOWN}~   Establish range (COLUMN) containing all items
{END}{DOWN 3}{RIGHT 2}         Go to total figure
/rncTOTAL~{BS}~                Name that cell TOTAL
{GOTO}C10~
{BLANK TOTAL}
{FOR COUNTER,1,@count(column)-1,1,TWO}  Set loop count by counting items
{MENU}C~J23~                              in COLUMN and subtracting 1
{RIGHT}{RIGHT}{MENU}C~J25~
{IF @MID(+$J$23,2,2)<>"00"}{BRANCH THREE}
{LET TOTAL,TOTAL+J25:VALUE}
{LEFT}{LEFT}
{DOWN}
```

Figure 4: *A modification of the macro in Figure 3 to allow for longer columns.*

bers ending in "00" are subtotals whose components are broken out in the lines below. The macro that begins in cell C26 checks every item in column C and includes in the Total Expenses amount only those expenses associated with account numbers ending in "00". Cells J23 and J24 referred to in the macro are off-screen work areas.

Larry Weeman
Old Orchard Beach, Maine

This is an interesting use of Symphony*'s FOR statement, but two other solutions to this problem occur to me. First, since column E lists subtotals and their constituent values, every expense is, in effect, stated twice. You could arrive at the $10,000.00 total expense figure simply by summing all the values in column E and dividing by 2! If that seems too simple, you could, with very little modification, set up the Expense Analysis as a database and use the @DSUM function to add only those values that met the right criteria. This would eliminate the need for a macro.*

Finally, if you must use a macro, it might be better to write one that would work for a column of any length. Because of the absolute value of 10 in line 28 and the cell address E22 in line 32, your macro, as written, will work only if there are 11 items in column C. The somewhat modified macro shown in Figure 4 will work for a column of any length. However, both macros would run considerably faster if the test operation (line 31, Figure 3) took place before *the copy operations in lines 29 and 30, thus manipulating only those values associated with a "00" account number.*

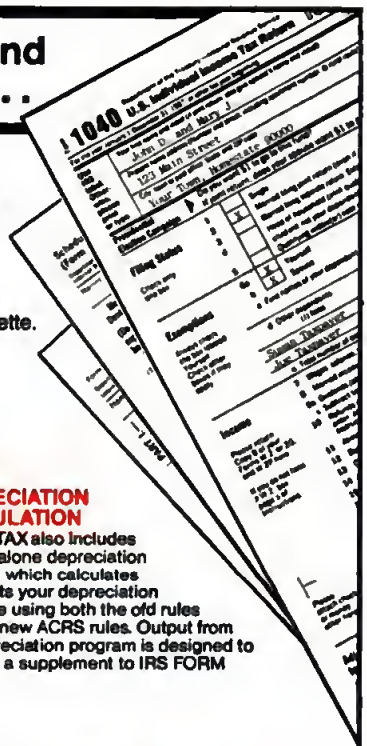
Both macros would run faster if the test operation took place before the copy operations, thus manipulating only those values associated with a "00" account number.

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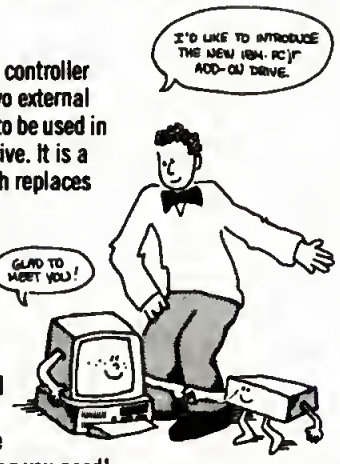
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EDITED BY PAUL SOMERSON

Power User

Push your hardware and applications software to the limit with these productivity-enhancing tips from readers.

Internal Border-Color Setter

As most WordStar *3.3x power users know by now, it's simple to change the program's foreground and background colors by patching addresses 284, 28B, and 2D5. I normally use blue text with red highlights on a white background, which means placing a 74 at addresses 284 and 2D5 and a 71 at 28B. For white text and light blue highlights on a dark blue screen, put a 13 at addresses 284 and 2D5 and a 17 at 28B.*

WordStar *doesn't contain any code to set the border, so unless you first run a separate color-setting program, your colorful editing screen is surrounded by a somber black. But it's a breeze to install a tiny border-setting routine in an unused part of WS.COM. All numbers that follow are in hexadecimal notation, unless otherwise specified.*

Service ØB of BIOS Interrupt 1Ø will do all the work for you. Just MOVe a Ø into BH, whichever of the (decimal) 16 possible border colors you want into BL, and the number of the service routine (ØB) into AH—and then invoke INT 1Ø. You can save a step by MOVing the border-color number, preceded by ØØ, into BX. This whole process, with an added RET exit, takes only 8 bytes.

To insert this code into WordStar, *you first have to find some unused real estate. At those addresses in the mid-2ØØs, WS.COM keeps track of such settings as colors, delay lengths, default disk drive, and number of lines and columns on-screen. Following these setting bytes is an area set aside for patches. Since some users may already have patches at the bottom of this blank space, we'll put it at the top, at address 34Ø.*

The first thing WS.COM does when you turn it on is JuMP to address 3AB1. We'll make this the second thing it does, right after setting our border color, by changing the JMP address to 34Ø. Then at 34Ø we'll insert the small border setter and follow it immediately with the detoured JMP to 3AB1. In the example below, we'll set the border to light blue with a MOV BX,ØØØ3 instruction. If you want to use a different border, change the ØØØ3 to any other color. For instance, ØØØC would make it intense red (which is sort of salmon-colored on an IBM RGB monitor).

Be sure to try this and all other patches with a ***backup copy*** *of WS.COM so you don't hurt your original! And before you try this, make sure you don't already have any patches at address 34Ø. Use DEBUG to look inside WS.COM (by typing DEBUG WS.COM) and at the DEBUG – (hyphen) prompt, type*

```
D 34Ø 34F
```

and hit the Enter key. You should see 16 pairs of zeros and then 16 periods at the right edge of your screen.

(If something other than 32 zeros appears—which is unlikely—try the same thing with address 27Ø, typing D 27Ø 27F. If you see the 16 pairs of zeros starting at 27Ø, follow the instructions below but substitute 27Ø for 34Ø in the two places 34Ø appears.)

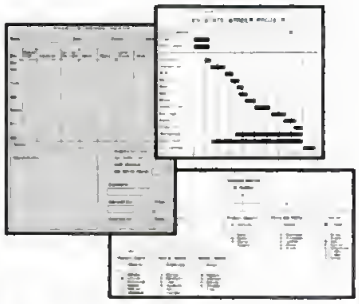
In either case, once you've typed DEBUG WS.COM, type the following to give WordStar *a light blue border, hitting Enter at the end of each line,* ***including the blank lines after the two JMP instructions:***

```
A 1ØØ
JMP 34Ø

A 34Ø
MOV BX,ØØØ3
MOV AH,B
INT 1Ø
JMP 3AB1

W
Q
```


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Load WordStar *and you should see the new border color. If you don't, erase the version of WS.COM you just patched, make another copy, and try again. Never patch your original!*

An idea somewhat similar to this was submitted by Allan Schwartz of San Jose, California, but his used an OUT instruction (which isn't as kosher as the BIOS call above) and trashed a WordStar *JuMP in the process. Still, it was a nice try, and he'll get his $50 plus a $25 disk bonus. Keep sending patches and tricks to User-to-User, Power User, and Spreadsheet Clinic—and put them all on disks.*—**P.S.**

```
N WS.COM
L
N WSEGA.COM
E 248 2B
A 2A4
JMP 2E0
NOP
JMP 302
NOP

A 2E0
MOV AH,03
MOV BL,00
INT 10
MOV [0308],CX
MOV AX,0003
INT 10
MOV AX,1112
MOV BL,00
INT 10
MOV AX,1200
MOV BL,20
INT 10
MOV CX,0007
JMP 030A
MOV AX,0003
INT 10
MOV CX,0000
MOV AH,01
INT 10
RET

W
Q
```

Figure 1: *SCRIPT file to create WSEGA.COM that will run* WordStar *in 43 columns an an ECD manitar. Creote o text file contoining everything obove, ond be sure to include the two blank lines after the NOP and the RET. Alsa, be sure to put o carrioge return ot the end of eoch line, including the very last ane. This is far calor systems (for mono, change the MOV AX,3 lines in two places ta MOV AX,7). Then put WS.COM and ony version of DEBUG 2.0 or loter on your disk olong with this SCRIPT file ond then type: DEBUG < SCRIPT*

43-Line WordStar

IBM's crisp new EGA is capable of displaying 43 lines of eminently readable text, which means you can display nearly a full page at one gulp. Unfortunately, mast word processors don't know how to exploit this feature, and patching them to take advantage of it is almost impossible.

Not so with WordStar, *which was designed to be easily customized and which has specific areas set aside internally for such alterations. Several approaches to making* WordStar *run in 43 columns have already been published, but most are long, involved kludges that force users to run companion .COM programs and silly little batch files before loading* WordStar.

We asked PC expert Calvin Shields how to get the job done efficiently, and he provided us with the DEBUG script in Figure 1. If you're currently using WordStar *on an EGA and you want the extra lines, simply type in the script, put WS.COM and Version 2.0 or later of DEBUG.COM on your disk, and type*

```
DEBUG < SCRIPT
```

The script will automatically load your old version of WordStar, *make the necessary changes, and save them to a new file called WSEGA.COM. Then just run WSEGA as you normally would WS.*

This patch is designed to work on an ECD color monitor. To adapt it to work on the IBM mono display (with the EGA card only), change the MOV AX,3 instruction in two places to MOV AX,7. In addition, the MOV CX,7 instruction resets the cursor to make it a full block rather than an underline. If you want another kind of cursor, change the 7 in that line.

SCRIPT also contains instructions for correcting the PrtSc routine. And it assumes you haven't already patched WordStar's *customization area, which mast of you presumably haven't touched. The patch works by increasing the page-size byte at &H248 from &H18 to &H2B and then JuMPing on initialization to the patch area at &H2A4, where the main routine is inserted. (It also cleans up after itself when it's done.) If you want to take up only 42 lines and not write over your function-key labels, change the 2B that is in the fourth line to 2A.*

The nice thing about this patch is that you can run 43 lines of WordStar *without also having to load a whole set of ancillary programs and batch files. I've used it for a few weeks, and I'm hopelessly hooked.*
—**P.S.**

Super File Stripper

A recent Power User submission in the August 6, 1985, issue of *PC Magazine* (Volume 4 Number 16) featured a Turbo Pascal program that converted *WordStar* files to ASCII files. I've written an assem-

```
N strip.com
A
CLD
MOV DX,014C
MOV CX,FC00
XOR BX,BX
MOV AH,3F
INT 21
OR AX,AX
JZ 014A
MOV CX,AX
MOV SI,DX
MOV DI,DX
LODSB
CMP AL,1A
JZ 0134
AND AL,7F
CMP AL,1F
JNZ 0124
MOV AL,2D
CMP AL,20
JNB 0134
```

(Figure 2 continues with no intervening space.)

(Figure 2 continued)

```
CMP AL,09
JZ 0134
CMP AL,0D
JZ 0134
CMP AL,0A
JNZ 0137
STOSB
CMP AL,1A
LOOPNZ 0117
PUSH AX
MOV CX,DI
SUB CX,DX
MOV BX,0001
MOV AH,40
INT 21
POP AX
CMP AL,1A
JNZ 0104
INT 20

RCX
4C
W
Q
```

Figure 2: *SCRIPT file ta create a fast* WordStar*-to-ASCII STRIP.COM filter. Use an ASCII word processor such os EDLIN or* WordStar's *N mode to type in the instructions obove, ond coll the file SCRIPT. Put a carrioge return ot the end af every line, including the last one. Then copy any version of DEBUG 2.0 or later anta your disk ond type DEBUG <SCRIPT ta create the STRIP.COM file. To use it to strip a hypothetical file called NONASCII and end up with a clean file called ISASCII, type STRIP <NONASCII >ISASCII*

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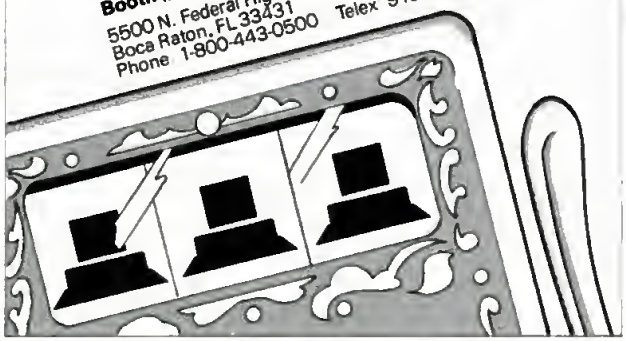
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bler language version that works much faster. It filters large chunks of the input file (up to 63K if necessary) instead of reading and writing one byte at a time. And it's just 76 bytes long, which makes it easy to type using DEBUG.

Phillip Cheng
Wayne, New Jersey

This is one of the fastest and most compact WordStar*-to-ASCII stripping programs we've received. To create it, use a pure-ASCII word processor such as EDLIN (or* WordStar*'s N mode) to type the instructions in Figure 2, making sure to hit the Enter key at the end of each line, including the very last one. Then copy DEBUG (in any version 2.0 or later) onto your disk and type*

```
DEBUG <SCRIPT
```

To use the STRIP.COM filter with a hypothetical WordStar *file called NONASCII, you just type the following:*

```
STRIP <NONASCII
```

and you'll be able to read the cleaned file on your screen. If you want to create a cleaned file called ISASCII, just type

```
STRIP <NONASCII >ISASCII
```

Bottom-Line Help

After using *WordStar* for several months, I decided to change its function-key settings. The *WordStar* installation program successfully changed the function-key definitions but not the labels on the 25th line. By examining WS.COM with DEBUG, I was able to find the addresses for the text labels, as follows:

```
Key Address
F1  5169
F2  5179
F3  5189
F4  5199
F5  51A9
F6  5199
F7  51C9
F8  51D9
F9  51E9
F10 51FB
```

Each character is followed by a byte that represents the character's color on-screen, so if you want to leave the colors the way they were but change the text, you have to patch every other byte. However, this arrangement also lets you change the colors of the labels any way you want.

Sander J. Rabinowitz
Farmington Hills, Michigan

You must be using a nonstandard version of WordStar*, since Version 3.3x of WINSTALL lets you change the text labels as well as the function-key definitions themselves. Also, your addresses are &H100 bytes too high. (*WordStar*'s real addresses*

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are even an additional &100 bytes lower, but DEBUG starts at &H100 rather than &H0, and in this column addresses are commonly expressed in how DEBUG sees them.) So if readers using IBM PCs and WordStar *Version 3.3x want to modify their function-key label line, they should use these WS.COM addresses:*

```
Key Address
F1  5069
F2  5079
F3  5089
F4  5099
F5  50A9
F6  50B9
F7  50C9
F8  50D9
F9  50E9
F10 50FB
```

If you examine your WS.COM with DEBUG, you'll see that each character of the function-key numbers (F1, F2, etc.) has the attribute byte 0F, which for color users means a high-intensity white letter on a black background. Each of the text characters in the labels themselves has an attribute byte of 70, which means a black letter on a white background. To change the colors of the labels, substitute two-character hex numbers for 0F and 70, where the left digit is the hex value of the background and the right digit is the hex value of the foreground. To end up with red text on a cyan background, you'd replace each 70 with a 34. If you want to drive yourself crazy, you can make up the whole bottom line out of a rainbow of characters. Be sure to pad out unused spaces with hex-character 20s and give these spaces the same color attributes as the adjacent text.

By now I know my function keys awfully well. I can touch-type them as well as all the other keys on my keyboard. So I turned the bottom line off entirely by changing the screen-length byte at 248 from 18 (which means WordStar *will display hex 18, or decimal 24 lines) to 19, and by changing the byte at address 5041 from 8D to C3.*

Incidentally, if you want to change the Version 3.3x function-key definitions themselves, the ten function keys—followed by Home, Cursor Up, Page Up, Cursor Left, Cursor Right, End, Cursor Down, Page Down, Insert, and Delete (which are all really function keys if you think about it)—start at address 66E.

Each function-key definition is 9 bytes long. The first 2 bytes are the scan codes of the struck keys themselves (F1 is 3B 5E; Home is 47 00). With the ten real function keys, the second byte is the scan code of the Ctrl key–shifted version of the function key; with the keys like Home and End, the second byte is 00. The third byte is the number of keystrokes that the function executes, up to six. The last 6 bytes are the actual keystrokes the function key will execute. If you don't use all 6 keystroke bytes,

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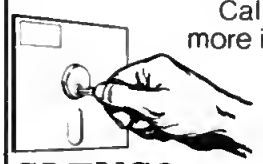
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pad the unused ones with hex 2As. One last warning—if the keystrokes are Ctrl key–shifted (like ^K), the scan code is the normal scan code of the key minus &H40. The normal hex scan code for K is &H4B. &H4B − &H40 = &H0B. Another way to look at it is that this particular scan code is the position in the alphabet. So ^K is 11 (&H0B hex), ^B is 2, etc.

As an example, to make F1 ^KS^QP (save and return to where you were in the document), you would type everything underlined here, hitting the Enter key at the end of each line

```
A>debug ws.com
-e 670 4
-e 671 b
-e 672 53
-e 673 11
-e 674 50
-w
Writing 5380 bytes
-q
```

In this case, you would assume that the first 2 bytes—the scan code of the F1 key—are already correct. And you would also assume that the last 2 bytes were already padded with hex 2As.

Anyway, this procedure can be tricky, and WINSTALL makes it easy (but slow), so why not use it for both the function-key definition and the labels?

Faster Starts

I often find it unnecessary to have the initial *WordStar* screen scroll past every time I want to turn the program on. I've found a way to fix W.COM to skip this first message. Make sure DEBUG.COM and WS.COM are on your disk, and type everything underlined, hitting the Enter key at the end of each line:

```
A>debug ws.com
-e 2d2 0
-e 4d26 eb 35
-w
Writing 5380 bytes
-q
```

Another speed-up: Since I find it cumbersome to have to type "EXE2BIN filename filename.COM" when turning .EXE files into .COM files, I patched EXE2BIN.EXE to do it directly. To do this, type everything underlined:

```
A>ren exe2bin.exe e
A>debug e
-e 4bb "COM"
-w
Writing 0680 bytes
-q
A>ren e exe2bin.exe
```

Phillip Cheng
Wayne, New Jersey

Like everyone else, I hate wading through lots of introductory screens, and this does shave a second or two off every session. But WordStar*'s one screen is not that intrusive (and the 0 you put at address 2D2 makes the time delay as brief as possible; the other places you can remove delays by bringing them to zero are 2CF, 2D0, 2D1, and 2D3, but experiment with these before you zero them all out). And you wouldn't want to remove the copyright notice, would you?*

Like everyone else, I hate wading through lots of introductory screens, and this WordStar fix does shave a second or two off every session.

Incidentally, in the instructions for forcing EXE2BIN.EXE to give all its output files a .COM extension, the 4BB address is for DOS 2.0 only. For other versions, use DEBUG's S (search) command to look for the address of "BIN" and substitute it for the 4BB in the above example. For instance, in DOS 3.1, the address is 4A1.

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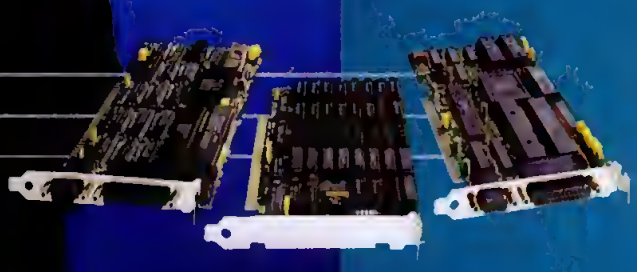
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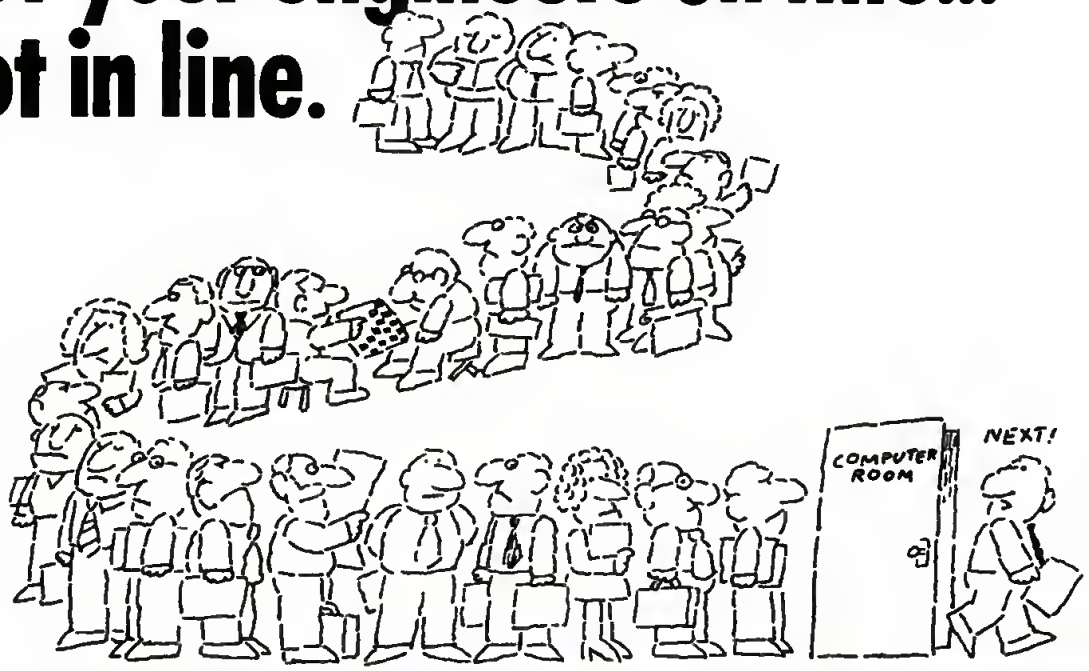
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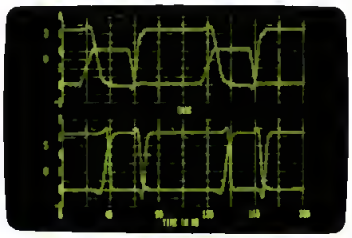
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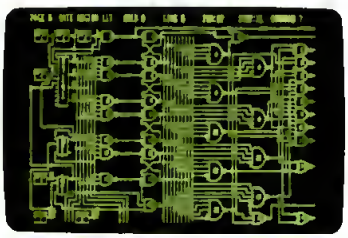


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EDITED BY PAUL SOMERSON



User-to-User

Readers share their favorite tricks for getting the most out of DOS, BASIC, and their systems in general.

Color CLS

A recent *PC Magazine* Power User column (Volume 4 Number 16) demonstrated how to change the default colors in Turbo Pascal. The instructions in Figures 1, 2, 3, and 4 will let DOS users patch COMMAND.COM so that CLS will set the screen to any color. This will work on both the standard and enhanced color graphics cards, and on the PC and AT.

If you don't mind a black border, just use the DEBUG command to edit the appropriate screen attribute byte. See Figure 1 for the simple instructions to patch just the foreground and background DOS 2.1 COMMAND.COM CLS command. With this patch the screen reverts to bright yellow text on a blue background whenever you type in CLS. You will no longer need a small .COM file or ANSI.SYS to run DOS in color. If you do use ANSI.SYS, the patch will be overridden.

Figure 2 includes patches to change the border colors of all versions of DOS 2.0 and higher. Complications arise in each version because the original CLS command selects black as the border color by XORing the BX register. Inserting extra code to MOVe the desired number into the register would lengthen COMMAND .COM by one byte. I avoided this by rearranging the code of the CLS portion of COMMAND.COM and taking advantage of a zero that is left in the BH register. Figures 3 and 4 show the before and after CLS addresses.

The border patch won't work on an EGA configured for the high-resolution 640 by 370 mode; BIOS prevents a border color from being set in this mode. It can be set, however, if the standard RGB monitor is attached.

If you want to make additional color changes, edit the bytes shown in the table in Figure 4. One final note—if you are using a patched version of COMMAND .COM and are prompted to insert a disk containing COMMAND.COM in drive A:, you must insert a disk containing the patched version.

J. E. Lewis
Edmonton, Canada

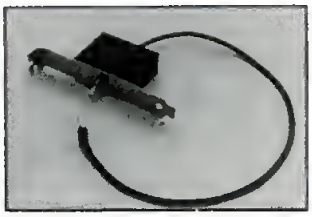
Finally, a color patch that doesn't involve extra .COM programs or ANSI drivers. It's fairly easy to use colors other than the anes in the example (as shown here, an attribute byte of 1E and a border of 01 yields both a border and background of dark blue with intense yellow text). The two-character hexadecimal attribute byte stores the foreground as the rightmost character and the background as the leftmost character.

Pick a hex number from 0 to F for each, where 0=black, 1=blue, 2=green, 3=light blue (cyan), 4=red, 5=purple (magenta), 6=either brown or yellow depending on your monitor (IBM's monitor produces a true brown; others may not), 7=grayish white, 8=dark gray, 9=bright blue, A=bright green, B=bright light blue, C=bright red, D=bright purple, E=bright yellow, and F=overintense white. So green text on a purple background would be 52, and bright red text on a light blue background would be 3C. The border color is obviously just a single character from the above list.

```
A>DEBUG COMMAND.COM
-E 2359 1E
-W
Writing 4580 bytes
-Q
```

Figure 1: *Sample patch to change the screen colors for DOS 2.1. The new screen attributes in this case ore 1E, where 1 = o blue background, and E = bright yellow foreground. Type in everything underlined, and hit the Enter key at the end of eoch line. This will leave the border color black.*

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File Protector

One of the problems of sharing a personal computer with others is that DOS doesn't make it simple to protect your files from accidental deletion. This isn't such a serious problem with floppies, but it can be a killer if you share a hard disk with other users, especially if the others are new to the PC. Hidden files are immune to deletion, but they're also invisible to the DIR command, and you can't tell that they're there unless you have access to a special utility.

The assembly program in Figure 5 uses DOS Interrupt 43h to alter the attribute byte of a file and make it read-only. The protection is not infallible (you can easily write over a file with a program that has the same name). However, any file protected this way can be listed by DIR but is invisible to the DEL command. This trick protects files only; to create another utility that will unprotect them, change the

```
MOV CX,21
```

line to

```
MOV CX,20
```

and the

```
N PERM.COM
```

line to

```
N UNPERM.COM
```

Incidentally, Michael Robert's RENDIR.COM from the August 6 User-to-User (Volume 4 Number 16) encouraged me to do some snooping around with subdirectories. I've noticed that if you turn on the hidden file attribute for a subdirectory entry, the subdirectory remains hidden to

```
=== FOR DOS 2.0 ===

A>DEBUG COMMAND.COM
-E 2346 1E
-M CS:2337 2352 CS:2331
-A 234D
xxxx:234D MOV BL,01
xxxx:234F MOV AH,0B
xxxx:2351
-W
Writing 4500 bytes
-Q


=== FOR DOS 2.1 ===

A>DEBUG COMMAND.COM
-E 2359 1E
-M CS:234A 2365 CS:2344
-A 2360
xxxx:2360 MOV BL,01
xxxx:2362 MOV AH,0B
xxxx:2364
-W
Writing 4580 bytes
-Q
```

```
=== FOR DOS 3.0 ===

A>DEBUG COMMAND.COM
-E 2428 1E
-M CS:2418 2434 CS:2412
-A 242F
xxxx:242F MOV BL,01
xxxx:2431 MOV AH,0B
xxxx:2433
-W
Writing 561A bytes
-Q


=== FOR DOS 3.1 ===

A>DEBUG COMMAND.COM
-E 2642 1E
-M CS:2632 264E CS:262C
-A 2649
xxxx:2649 MOV BL,01
xxxx:264B MOV AH,0B
xxxx:264D
-W
Writing 5AAA bytes
-Q
```

Figure 2: *Instructions for changing both the border and the screen attributes for versions of COMMAND.COM in DOS 2.0 and higher. The patches assume COMMAND.COM has not previously been altered. If already altered, edit the bytes shown in Figure 4. Ignore the xxxx's; the numbers that appear here will vary from system to system. This will yield bright yellow text on a blue background with a blue border. To select a different foreground and background, change the 1E in the second line. To pick a new border, change the 01 in the MOV BL,01 line.*

casual users, but you can still CD to it, add or delete files in it, place it on your PATH, and execute programs in it from other subdirectories. This can be useful when you want to keep several programs in a semi-protected state.

R. Chung
Berkeley, California

Very handy. One note—you don't need a special utility to see what hidden files are on your disk. Just type CHKDSK/V and they'll all show up (along with all the other files on your disk). To create the PERM .COM and UNPERM.COM files, type the assembly language instructions in the figure into a file called SCRIPT, then make the two changes in the text above and create another file called SCRIPT2. Then make sure DEBUG (in a version of DOS 2.0 or higher) is either on your disk or properly PATHed to, and type

```
debug<script
```

Then, on the next line, type

```
debug<script2
```

to create the files. To use them, type in

```
perm filename
```

to protect the file, and type in

```
unperm filename
```

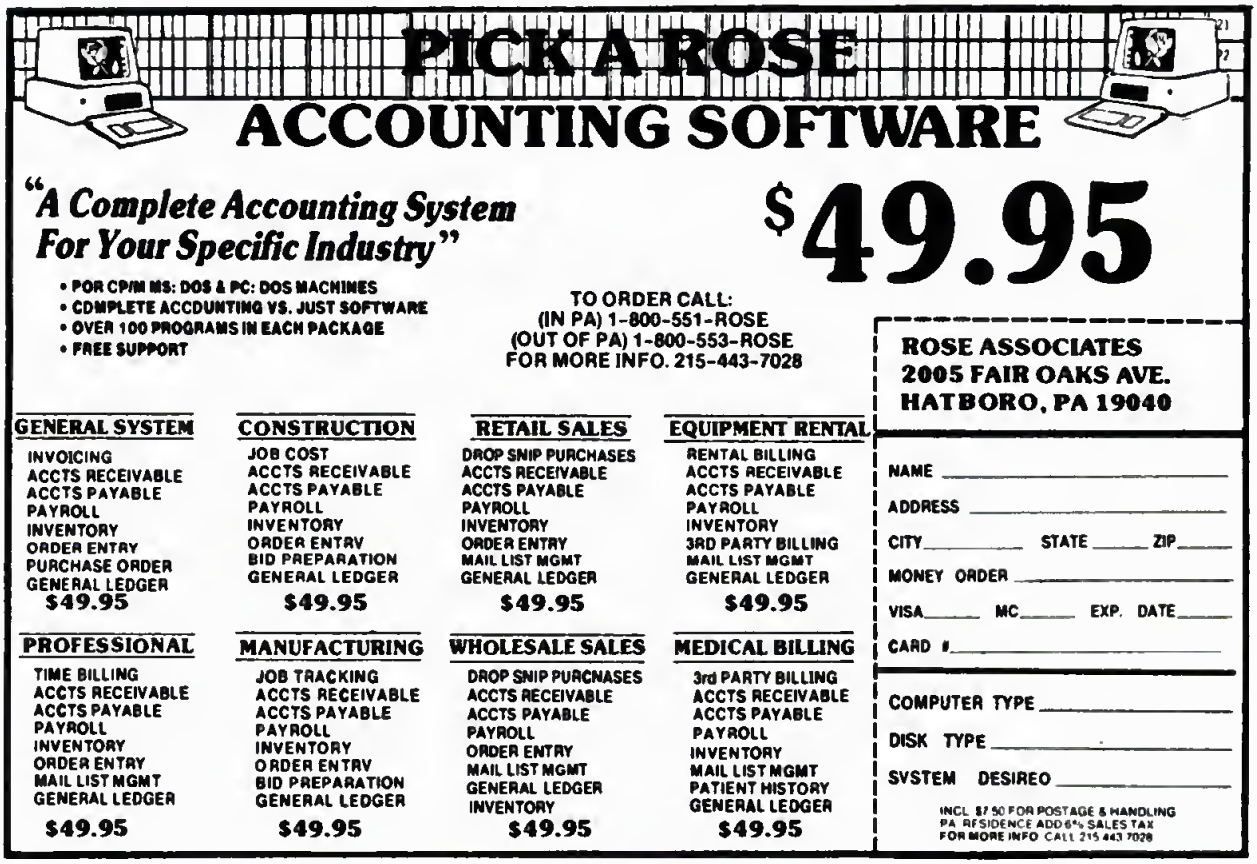
to unprotect it. Trying to delete a PERMed file will result in the chilling message "Access denied."

DOS Version	Location of CLS Command	Address of Screen Attribute Byte
2.0	2331–2353	2346
2.1	2344–2366	2359
3.0	2412–2345	2428
3.1	262C–264F	2642

Figure 3: *Standard addresses before the border patch is made to COMMAND.COM.*

DOS Version	Address of Screen Attribute Byte	Address of Border Attribute Byte
2.0	2340	234E
2.1	2353	2361
3.0	2422	2430
3.1	263C	264A

Figure 4: *New addresses after the border patch is made to COMMAND.COM.*



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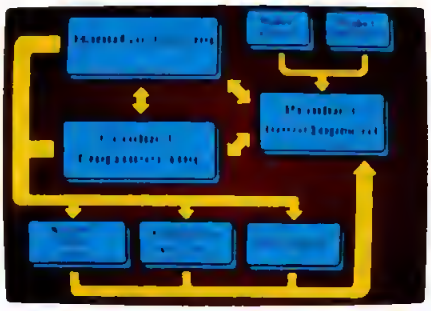
What's more, with the new 3.0 PC Paintbrush, you can draw rounded boxes, rubber band curves and circles, and edit pictures many times larger than the screen.

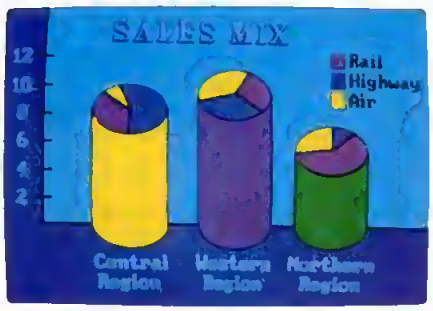
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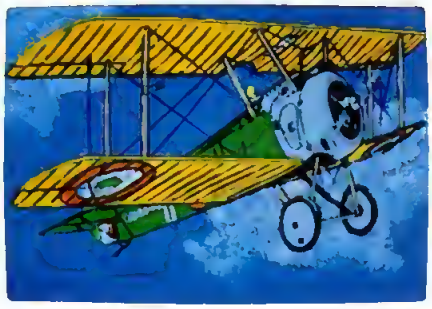
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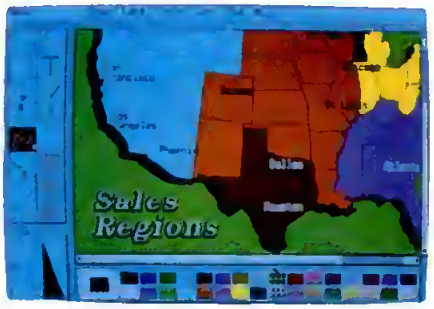
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CIRCLE 473 ON READER SERVICE CARD

```
A 100
MOV BX,80
INC BX
CMP BYTE PTR [BX],20
JZ 103
MOV DX,BX
INC BX
CMP BYTE PTR [BX],0D
JZ 116
CMP BYTE PTR [BX],20
JNZ 10B
MOV BYTE PTR [BX],0
MOV CX,20
MOV AL,1
MOV AH,43
INT 21
INT 20

RCX
24
N UNPERM.COM
W
Q
```

Figure 5: *Instructions for creating PERM.COM to make files read-only and protect them from erasure. Type this using a pure-ASCII word processor such as* WordStar's *N mode—and name it SCRIPT. Make sure DEBUG.COM (Version 2.0 or higher) is on your disk, and make sure you leave the space after INT 20 and put a carriage return at the end of each line. Then get into DOS and type DEBUG<SCRIPT to create the file. To create UNPERM.COM to restore the file to normal, change the MOV CX,21 line near the bottom to MOV CX,20 and change the N PERM.COM line to N UNPERM.COM—and name this SCRIPT2. Then type DEBUG<SCRIPT2 to create the UNPERM file.*

Easy Unprotection

BASIC offers a simple way to "protect" programs by saving them with a ",P" option, which prevents users from listing their contents. However, it doesn't provide a way to unprotect such programs.

If you try to list a protected BASIC program and are unable to do so, simply run UNPROT.BAS (see Figure 6), which will prompt you for the name of the protected program. After UNPROT runs, it will leave the cursor on the third line of the screen, at the beginning of the line

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CIRCLE 522 ON READER SERVICE CARD

"s=18:call s". At this point simply hit the Enter key (which executes the CALL statement in direct mode), and you'll find that you can then list the formerly protected program.

David C. Griffith
Seffner, Florida

Here's another way to unprotect programs: Get into BASIC and type

```
BSAVE "U",Ø,1
```

which creates a 9-byte program on your disk called U.BAS. Then, whenever you load a protected program and get an "Illegal function call" message when you try to list it, just type

```
BLOAD "U",1124
```

and you'll find you can list the program as you can an unprotected program.

In both cases, be sure that once you've unprotected the formerly protected program, you save it the conventional way, without the ",P" option. If you use the UNPROT.BAS program, type it in exactly as shown, with the semicolons at the ends of lines 0110 and 130, and enter the protected program's entire filename when prompted, including the extension.

```
100 ' UNPROT.BAS -- by David Griffith
110 CLS:PRINT "When this program terminates, ";
120 PRINT "it leaves a short program onscreen."
130 PRINT "Press enter for it to work, as ";
140 PRINT "it must be done from 'command' mode."
150 INPUT "Enter name of program to unprotect: ",P$
160 FOR A=1 TO 6:READ B:POKE A+17,B:NEXT
170 PRINT "s=18:call s":LOCATE 3,1:LOAD P$
180 DATA 48,192,162,100,4,203
```

Figure 6: *Program to unprotect BASIC programs saved with a ",P" option. When UNPROT prompts you for the name of the protected program, be sure to type in the full name, with its extension. After the program runs, and the cursor is on the line that begins "s=18:call s", hit the Enter key to complete the unprotection process. Then be sure to SAVE the formerly protected program. Also, type the program exactly as shown, with the four PRINT statements at the beginning, and the semicolons at the ends of lines 110 and 130.*

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PC Reviews in Brief

Nissho NP-910: A Surprisingly Good Printer

BY CHARLES PETZOLD

Several surprising facts emerged from *PC Magazine*'s recent printer roundup (Volume 4 Number 19). Although we had expected to see many more 24-pin dot matrix printers, the 9-pin models still dominated. Also, some printer manufacturers—themselves seemingly uncertain whether to support IBM Graphics Printer or Epson FX-series control sequence compatibility—simply built both into many printers to allow the customer a choice. The new Nissho NP-910 wide-carriage dot matrix printer fits right in with these trends. This is a large, sturdy, well-built machine. Although the print quality is not as attractive as that from its 24-pin cousin (the Nissho NP-2410), it is very good for a 9-pin printer.

The Nissho NP-910 sped along at 150 characters per second in its default draft mode. No other dot matrix printer tested by *PC Magazine* in either the 1984 or 1985 printer surveys broke 150 cps with a $1,695 (or lower) price tag. You'd have to spend an additional $300 or more to get this speed from other printers.

Better print qualities showed appreciable reductions in speed, however. The "Courier 10" letter quality font slowed down printing to about 34 cps. This is not just an emphasized or double-pass printing mode, however—it's a whole different font that requires a close look to see the jaggies.

Although you can select the fonts (draft and Courier) and sizes (10, 12, 15, and 18 characters per inch) through software sequences, a concealed control panel offers a handy alternative. Four slide switches and two thumbwheel switches—all clearly labeled—provide font and size selection as well as forms length (ten selections from 3 to 14 inches), italic, bold, six or eight lines per inch, and a choice of unidirectional or bidirectional printing. The 18-cpi selection—capable of printing 237 characters across—can be combined with the Courier font. Other printers often restrict the compressed mode to the draft font only.

While I'm a little leery of physical switches because they could become dirty and erratic, the cover should help lengthen their life. An easily removable interface card on the back panel (requiring only a coin and fingers to extract) gives access to a DIP switch and a ROM cartridge. A setting on the DIP switch controls IBM Graphics Printer or Epson FX compatibility. The printer-to-PC interface card may be changed for a serial interface and/or a 48K-byte RAM print buffer. (4K bytes is standard.) Other ROM cartridges are also available.

Like me, you've probably never heard of Nissho Corp. Considering the quality, speed, and price of the NP-910 printer, however, the company is making a powerful debut and will undoubtedly become a very familiar name in the printer marketplace. ■

Nissho NP-910 Dot Matrix Printer
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*Circle **673** on Reader Service Card*

Nissho NP-2410: Dots Amazing

BY M. DAVID STONE

The Nissho NP-2410 is very nearly my ideal dot matrix printer. It's fast, quiet, versatile, easy to use, and, owing to its 24-pin printhead, produces output that varies from highly readable to just short of true typewriter quality. And its proportional space font is so smooth that you'll have to study the page for telltale dots.

Setting up the NP-2410 is easy, thanks in equal measure to good design and good docu-





Two outstanding printers from Nissho Iwai American Corp.

mentation. The few parts that need assembly—including ribbon, platen knob, and power cord—simply fit where you would expect them to. Everything else you need to know, from how to set DIP switches to how to load paper, is clearly explained in the user manual.

Indeed, the documentation is good enough to deserve special mention. The two manuals that Nissho sent with the printer are marked "Tentative," but they are among the best printer manuals I've seen. The user manual is well written and includes useful illustrations. The technical manual covers the printer's control codes, explaining each one and giving examples of how to use them.

For most users, the technical manual is probably superfluous. The NP-2410 is DIP-switch selectable to imitate either an Epson LQ-1500 or IBM Graphics printer. Virtually all off-the-shelf software can be installed for either of these modes simply by making the appropriate choice from an installation menu.

Some of the more important print features are under the control of front-panel switches. In addition to controls for top of form, form feed, line feed, and the like, the NP-2410 has a set of "concealed" switches sitting behind a front-panel cover. These can select italic or bold, six or eight lines per inch, any of ten standard form lengths, unidirectional or bidirectional printing, and, most important of all, font style. The NP-2410 has seven built-in font styles and has room for a plug-in cartridge. You can also download fonts to the printer from your PC.

The built-in fonts include draft quality and letter quality modes at both 10 and 12 characters per inch, draft modes at 15 and 18 cpi, and a proportional space mode. Probably the least readable font in the batch is the 18-cpi draft mode, but this has more to do with the size of the characters than with any failing of the printer. As I've already mentioned, the worst the NP-2410 scores for print quality is "highly readable." The 18-cpi font should be particularly interesting to spreadsheet users, since it will let you print 237 characters per line. I timed it at 157 characters per second using *PC Magazine*'s standard printer speed test.

Draft quality at 10 cpi zips along at 132.8 characters per second, and copy looks better than that which many dot matrix printers produce as letter quality. On the minus side, the letter quality font at 10 cpi is a little lower in quality than I'd like to see. The letters are so thin that they draw your attention to them, and close inspection of the rough edges reveals that they are products of a dot matrix printer. Still, the letter quality mode is good enough for any but the most demanding word processing applications, and it doesn't hurt that it's printed at a respectable 84.2 cps.

The nicest surprise in print quality is the proportional-space font. Here again, a close look will show you the ragged edges of each character, but the overall effect looks so good that on first glance you might think it's typeset. This font clocks in at 95.9 cps; it's the font style I would use for business correspondence on this printer. According to Nissho, five plug-in cartridges are currently available for the printer: OCR A, OCR B, Prestige, and a 15-cpi letter quality font, but these were unavailable for review.

The NP-2410 has a few other features worth mention as well. Though I did not measure the noise level, working with the printer was enough to show me that it is reasonably quiet; I wouldn't mind sharing an office with it. Another nice touch is that the interface is available with either a standard 4K-byte RAM buffer for $100, or a 48K-byte buffer for $150. The extra buffer memory can free up your computer much more quickly on long printing jobs and is well worth the extra $50.

As should be obvious, the NP-2410 is a printer that deserves your attention. At $1,920 plus the cost of the interface, it is hardly a casual purchase. But if you're looking for a heavy-duty dot matrix printer with near-letter-quality output, the NP-2410 should be on your wish list. ■

Nissho NP-2410
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A Box for Baby's Shoes: Twentieth Century Shoebox

BY VINCENT PUGLIA

Throwing receipts into an empty box or folder and organizing them on the fly is probably the only home accounting method most of us ever learned. It is intuitive and easy to use, but it does have certain inherent limitations. *Twentieth Century Shoebox* seems to incorporate many of these limitations. While it may fulfill the most basic needs of a novice home user, it would have great difficulty keeping track of anything even remotely convoluted.

The concept of an entry-first, organization-later accounting system is not new, but Levins Engineering's program has as much in common with an accounting system as a calculator has with a spreadsheet. Many of the basic design features taken for granted on many programs are lacking. For example, some of the program's default colors, such as white letters on an cyan background, do not make for easy legibility.

Written completely in Turbo Pascal, *Twentieth Century Shoebox* uses four modes of operation: Enter, Browse, Report, and System. Each mode—displayed on the bottom of the screen—is accessed by hitting the Esc key. Each record is grouped under a category and has four fields: date, amount, notes, and tag. Because tags are used for subtotals, it is recommended that each category have its own unique tag names. One of the program's nicer features is its ability to reenter a previous entry's date, notes, and tag by hitting the Return key.

The Report mode is fairly straightforward. Generating a report requires specifying whether it should encompass all or specific records and whether they are to be detailed or summarized. You can also select a start and end date for periodic reports. Screen reports tend to scroll; therefore, it is necessary to have your fingers poised over the Ctrl and NumLock keys so they don't fly by you.

Browsing in *Twentieth Century Shoebox*'s lexicon means looking at one record at a time. The right-arrow cursor brings you down one level and the left-arrow cursor brings you up. The program does not provide for browsing through a screenful of records at one time.

The System mode enables you to view the directory, leave the program, and choose a new file to work on. On-line, context-sensitive help is available if you need it.

If you have a spreadsheet program, database management system, or word processor with math functions, you already have the makings of a better shoebox. *Twentieth Century Shoebox* is really a nineteenth century matchbox. ■

Twentieth Century Shoebox
Levins Engineering Inc.
P.O. Box 275
Palmetto, FL 33561
List Price: *$29.95*
Requires: *128K RAM, one disk drive, PC-DOS.*

*Circle **671** on Reader Service Card*

THE SHORT REPORT BY PHIL WISWELL

Taming Your Hard Disk the Easy Way: Part 2

The subject of daily hard disk maintenance and file management brings to mind hundreds of programs claiming to fill the bill, each with its own way of getting the job done. More often than not, however, the claims outstrip the actual performance. What follows is some straight talk about five very different solutions to hard disk headaches.

1 DIR

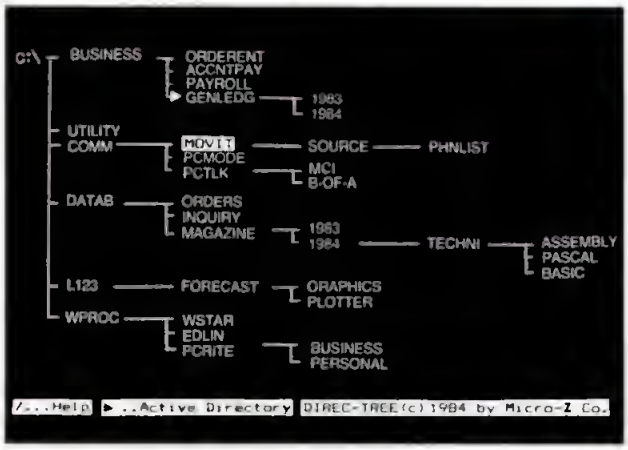
This disk contains the most comprehensive set of file and directory tools available, rivaling my current favorite, *XTREE*, for space on my hard disk. It provides an operating environment shell for DOS, a broad range of file and directory management functions, a powerful facility for creating batch files, password protection, and a menuing system.

1 DIR's display is nicely arranged into four screen areas: One lists subdirectories and their files (name, extension, and size), another shows disk and system statistics, a third contains toggle switches for various processing modes, and the last is a horizontal menu of *1 DIR*'s eight commands. Above the menu is the DOS prompt in case you want to perform a function not programmed into *1 DIR*.

My only complaints about *1 DIR* are that you can't expand the file listing to fill the screen, and there is no graphic depiction of the subdirectory tree. However, it makes up for that with such useful power features as automatic recording of a batch file while you execute commands, variable processing parameters, and file flagging for processing groups of files. Overall, *1 DIR* does indeed spell WONDER. (Bourbaki Inc., Boise, Idaho; (208) 342-5849; $95; requires 192K RAM, DOS 2.0 or later.) ■

The Direc-Tree

The biggest difference between *The Direc-Tree* and *1 DIR* is that this program displays a graphic of your directories in tree form, thus making it easier to grasp the overall picture of your disk's file structure. Beneath the tree display is a toggleable window of *The Direc-Tree*'s commands, divided into three categories: (1) file management for viewing, renaming, deleting, copying, moving, or executing a file; (2) directory management for creating, deleting, renaming, printing, or switching the active directory; and (3) miscellaneous commands for disk and system statistics, macros, and locating files. This program also sports a full-screen text editor. Finally, the usefulness and power of the graphic tree display should not be underestimated. (Micro-Z Co., Rolling Hills, Calif.; (213) 377-1640; $49.50; requires 128K RAM, DOS 2.0 or later.) ■



Direc-Tree's graphic picture of a hard disk's file structure

Hard Disk Management System (HDMS)

Unless you call PC-DOS itself a hard disk management system, the title of this program is a misnomer. It should read "*Hard Disk Menu System*" instead. Otherwise, its claims of providing quick program selection and execution as well as automatic I/O configuration are accurate.

HDMS is extremely easy to use, mostly because it doesn't have many features. There are only three commands other than those for installation, configuration, and a help menu: Program, which lets you load and run a program from a menu of 15 choices; Utilities, which lets you select DOS commands from a menu of 11 choices; and Directory, which displays a list of hard disk volumes and sizes.

The first five DOS commands—COPY, DIR, DELETE, RENAME, and TYPE—cannot be changed; however, the other six menu options are defined by the user.

If you're looking for a simple menu system that can address programs with different printer configurations—in any subdirectory and on any number of hard disk volumes—consider *HDMS*. But don't think it will make your file management worries disappear. (Global Technologies Corp., Aurora, Colo.; (303) 337-7758; $79; requires hard disk, DOS 1.1 or later.) ■

Startup!

This is the simplest menu generator I've seen. The program lets you design an unlimited number of menus, each containing up to eight selections. Other *Startup!* menus can be used as selections, so you can nest the menus in levels. The biggest drawback of *Startup!* is that you can place only .COM or .EXE files on your menus. No batch files. No BASIC programs. No variable parameters.

Startup! is designed for the computer neophyte who prefers to have commonly used programs listed in menu form for single-keystroke loading. However, without the capability to run batch and BASIC files or add parameters, this program doesn't offer many power features. My question is this: Who needs a menu to order fast food? (Vertical Solutions Inc., Evanston, Ill.; (312) 328-3961; $50; requires 64K RAM, DOS 1.0 or later.) ■



1 DIR's DOS screen provides considerable disk information.

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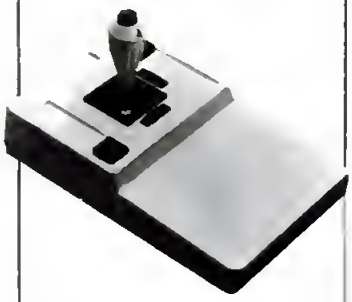
CIRCLE 206 ON READER SERVICE CARD

EDITED BY DAVID OBREGON

New on the Market

MICROSTICK

CH Products has produced a versatile joystick that can be used for cursor control in most PC applications. The MICROSTICK joystick features eight modes of movement, including one that precisely emulates the PC Mouse from Mouse Systems and another that emulates the characteristics of the Bit Pad One from Summagraphics Corp. These emulation modes allow the joystick to be used with a wide range of existing applications requiring either of these devices.



The MICROSTICK also has the ability to change from high resolution steps of 1, 4, or 8 parts in 4,096 (depending upon the angle of inclination of the stick) to very rapidly control cursor movement at the touch of a button. In addition, the automatic cursor control feature allows the host system to send coordinates to the joystick for instant positioning of the cursor. It can communicate via a standard RS-232 interface or optional 5-volt TTL or TTL inverted interfaces, at rates of 300, 1,200, 9,600 or 19,200 bits per second. Operational modes, data transfer rates, and a choice of continuous, discontinuous, or computer request output modes can be selected by the user either through DIP switches or software configuration.

List Price: *$279.95*

CH Products
1558 Osage St.
San Marcos, CA 92069
(619) 744-8546

*Circle **650** on Reader Service Card*

Viking Corner Workstation

Viking Acoustical Corp. has added a new component to its line of modular computer support furniture. The Corner Workstation is available in 24- or 30-inch tabletop widths and features a dropdown keyboard tray that is adjustable from 26 to 29 inches high, with tilt up to 15 degrees.



Viking Corner Workstation, *Viking Acoustical Corp.*

Offered in teak, putty, walnut, or oak finishes, the unit can be ordered without the keyboard tray. It can be matched with other components in the Viking line in a wide variety of configurations.

List Price: *Available from the manufacturer*

Viking Acoustical Corp.
Airlake Industrial Park
Lakeville, MN 55044
(800) 328-8385
(612) 469-3405

*Circle **647** on Reader Service Card*



PC2C System, *J & M Systems Ltd.*

PC2C System

PC*jr* users can upgrade their systems to full-scale PC-compatibility with J & M Systems Ltd.'s PC2C System. This user-installable package includes a replacement disk controller board that can support up to three double-sided disk drives, all necessary cabling, and one or two half-height drives in a separate enclosure. Also included is a configuration program that allows the PC*jr* to work with the additional drives.

List Price: *One-drive system, $295; two-drive system, $449; controller card alone, $149*

J & M Systems Ltd.
15100-A Central SE
Albuquerque, NM 87123
(505) 292-4182

*Circle **664** on Reader Service Card*

New on the Market Submissions Guide

All submissions to New on the Market should follow these guidelines:

1. Include the retail price and details of both hardware and software needed for an end-user to properly use your new product. This includes required amount of RAM, number and type of drives, operating systems supported, and peripheral equipment needed.
2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements may be included, but in most instances we need more information than is typically included in an ad. Include telephone contacts for marketing and technical questions.
3. If available, include black & white glossy photos of the product, 4 by 5 inches or larger.

New on the Market does not review products; do not send sample or demo copies of software. All product announcements are run on a space-available basis, at the exclusive discretion of the editor. Please note that it is impossible to guarantee publication of a product announcement for any particular issue.



PC-PAC,
Synergistics Inc.



PC-PAC

Synergistics Inc. has produced an electronic card access system that can be networked to an IBM PC. The PC-PAC system replaces conventional door keys and locks with plastic magnetic-striped cards and a range of card readers—256 of which can be linked to and monitored from a single PC. The system automatically unlocks a door when an authorized card is inserted in a reader and records the time, date, location, and identity of the card holder. An optional 12-button keypad card reader, available for high-security installations, requires the card holder to enter a unique Personal Identification Number when the card is inserted in the reader.

***List Price:** $6,900; with IBM PC, $9,985*
Synergistics Inc.
3 Erie Dr.
Natick, MA 01760
(617) 655-1340

*Circle **658** on Reader Service Card*

ESTeem Model 84

This wireless modem from Electronic Systems Technology can connect computer equipment into a 24-channel network without requiring special software or networking boards in each computer. Attached to existing equipment via standard serial RS-232 connectors, the ESTeem Model 84 encodes data prior to transmission using packet radio transfer technology. Each modem incorporates its own Z-80 microprocessor, permitting the units to communicate on narrow-band FM VHF frequencies at optimum rates regardless of the transfer rates of the attached computer or peripheral.

DIP switches on the back panel of the wireless modem allow the user to set data transfer rates for the RS-232 line and the transmission/reception frequency. In place of networking software, the user can communicate to remote locations using programs like *CROSSTALK* and *PC-TALK III* for data transfers.

***List Price:** $995.95*
Electronic Systems Technology
1031 N. Kellogg St.
Kennewick, WA 99336
(509) 735-9092
Telex: 15-2514

*Circle **661** on Reader Service Card*



***ESTeem Model 84,** Electronic Systems Technology*

Tight Security

This security program from Knipfty Software can compress ASCII or document files up to 50 percent of their original size while combining three encryption schemes with password protection. As an added security measure, *Tight Security* creates a separate key file needed to unlock the compressed and encrypted file.

The program offers two compression/decompression methods—Fast and Maximum. Using the Fast method, standard ASCII files are given a carriage return/line feed at the end of each line, and a file can be compressed in as little as one second. The Maximum compression method yields 2 to 3 percent tighter compression.

***List Price:** $99.95*
***Requires:** 128K RAM, one disk drive, DOS 1.1 or later.*
Knipfty Software
236 S. Park Ave.
Rockville Centre, NY 11570
(516) 764-6330

*Circle **659** on Reader Service Card*

ColorScreenPrint 2.0

Application Techniques Inc. has released a RAM-resident color printer support program that allows the user to produce color printouts of graphics screens simply by pressing the Shift and PrtSc keys. *ColorScreenPrint* is compatible with most applications and all major color/graphics adapters available for the IBM PC. Color printer support provisions allow the user to customize the software for the hardware used. Instead of the usual 7 or 8 colors normally available from most color printers, *ColorScreenPrint* can print 16 colors or a wide range of user-defined hue variations. Owners of monochrome printers can use the utility to print 16 different black-and-white patterns.

***List Price:** $79.95*
***Requires:** 128K, one disk drive, DOS 1.1 or later.*
Application Techniques Inc.
10 Lomar Park Dr.
Pepperell, MA 01463
(617) 433-5201

*Circle **670** on Reader Service Card*

qUANT IX Portfolio Evaluator

Investors wanting to use their IBM PCs to manage their portfolios have been given a new tool by Quant IX Software. The *qUANT IX Portfolio Evaluator* offers five quantitative valuation models, cash flow analysis, diversification index, what-if testing, security search, tax planning, and total portfolio accounting functions. It can handle either single or multiple portfolios.

***List Price:** $295; printed manual alone, $45*
***Requires:** 128K, one disk drive, DOS 2.1 or later.*
Quant IX Software
5900 N. Port Washington Rd., #146-A
Milwaukee, WI 53217
(414) 961-1991

*Circle **669** on Reader Service Card*

Disk Optimizer

This disk drive enhancer from SoftLogic Solutions Inc. can dramatically increase the performance of disks by collecting various portions of a file—often stored in scattered locations on-disk by DOS—and physically restoring them together in proper sequence. This process eliminates the undue delays in starting programs, reading files, and loading overlays that DOS often exacts as it searches for information scattered across a disk. Free space on-disk is made contiguous, permitting new data to be written to disk rapidly.

The *Disk Optimizer* also offers the user such functions as file encryption with password protec-



tion, plus a disk analyzer useful in determining the efficiency of the drive. Another included program, *File Peeker*, allows the user to examine any information stored on a disk in a variety of formats.

List Price: *$49.95*
Requires: *128K, one disk drive, DOS 2.0 or later.*
SoftLogic Solutions Inc.
530 Chestnut St.
Manchester, NH 03101
(603) 627-9900

*Circle **662** on Reader Service Card*

Word Connection

Flagstaff Engineering announces an innovative solution to document interchange between diverse word processing systems and the IBM PC. With the *Word Connection* system—which includes an 8-inch disk drive—document files can be transferred directly to a PC from such systems as Wang, Displaywriter, Xerox 860, OS/6, CPT, NBI, and other hard- or soft-sectored word processing systems.

The *Word Connection* system transfers document files at a rate of 2 seconds per page. All conversions produce a document in standard DCA (Revisable Text) format that are usable by such PC-based systems as *WordStar*, *MultiMate*, and others. In addition, the PC user can access documents directly on the 8-inch drive.

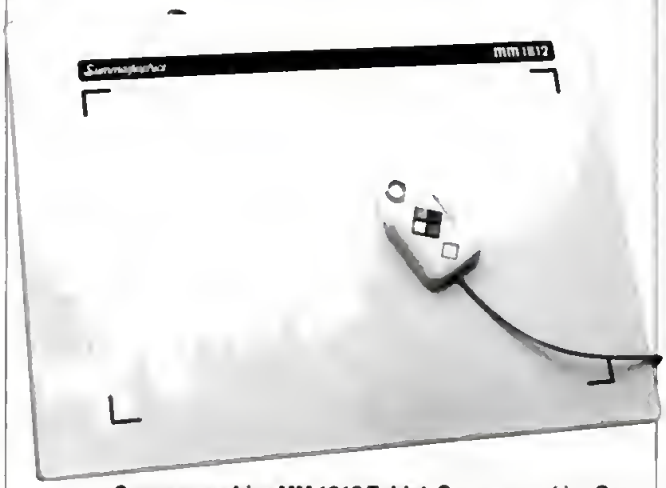
List Price: *$1,795*
Requires: *Depends on the PC word processor used.*
Flagstaff Engineering
1120 Kaibab Lane
Flagstaff, AZ 86001
(602) 774-5187
Telex: 70-5609

*Circle **668** on Reader Service Card*

Summagraphics MM 1812 Tablet

Summagraphics Corp.'s new 12- by 18-inch digitizing tablet provides a work area that accommodates one B-size or two A-size sheets of drafting paper. It uses either a four-button cursor or three-button mouse for digitizing and making menu selections, and a one-button stylus with a solid-state tip to perform functions defined by the user's application.

Depending upon the format chosen, the MM 1812 Tablet can provide digitizing resolutions of up to 1,016 lines per inch. Sampling rates can be remotely controlled from the host computer. The tablet's RS-232 interface is format-compatible with all other digitizers in the Summagraphics line. It incorporates a tilt mechanism for convenient orientation during use.



Summagraphics MM 1812 Tablet, *Summagraphics Corp.*

List Price: *$895; three- or four-button cursors, $99; stylus, $49; power supply, $55*
Summagraphics Corp.
777 State St. Ext.
Fairfield, CT 06430
(203) 384-1344

*Circle **651** on Reader Service Card*

THE Software Line

Indian Ridge Enterprises Inc. has released three programs—*THE Wordprocessor*, *THE Spreadsheet*, and *THE Name & Address System*—offering full functionality at low cost. The programs are available separately or as a complete package.

THE Spreadsheet includes an on-line tutorial and help system that guides the user through the steps of building a working spreadsheet. Available functions include copy, replicate, move, insert, delete, and blank features for cell arrays; centered, left or right justified for labels; global, column, row, and entry formatting; cut-and-paste of multiple spreadsheets; 20 special math functions; two separately scrollable windows to view separate areas of a spreadsheet; variable cell width; the ability to hold stationary any row or column while scrolling through a spreadsheet; manual or automatic recalculations; and search and/or determine the contents of any cell in a spreadsheet.

THE Wordprocessor has such editing features as erase, copy, or cut-and-paste blocks of text from a single character to several pages in length; the ability to edit ASCII files; user-selectable tab, indent, and margin settings; user-defined page breaks; and superscript or subscript. Printing can be proportionally spaced and/or justified, boldfaced, centered, or underlined.

THE Name & Addresss System is a simple file management system that can be combined with *THE Wordprocessor* for automated mail merging. Fields provided include names, two addresses per name, city, state, and ten-digit ZIP, and an open memo field for notes. Files can be sorted on any field.

List Price: *Each program, $29.95; all three, $75*
Requires: *128K RAM, one disk drive, DOS 1.1 or later.*
Indian Ridge Enterprises Inc.
508 Second St.
Oakland, CA 94607
(800) 227-2400, ext. 921
(800) 772-2666 in Calif.
(415) 268-1631

*Circle **667** on Reader Service Card*

Public Domain Software Catalog

The Public Domain Software Copying Co. is offering a 20-page catalog of low-cost programs available in the public domain. Each listing in the catalog states the program's name, size, and price and gives a short description of the program's functions. Included in the catalog are programs offered by several PC user groups.

Cover Price: *$2*
The Public Domain Software Copying Co.
33 Gold St., #L-3
New York, NY 10038
(212) 732-2565

*Circle **657** on Reader Service Card*

Pinnacle Series Disks

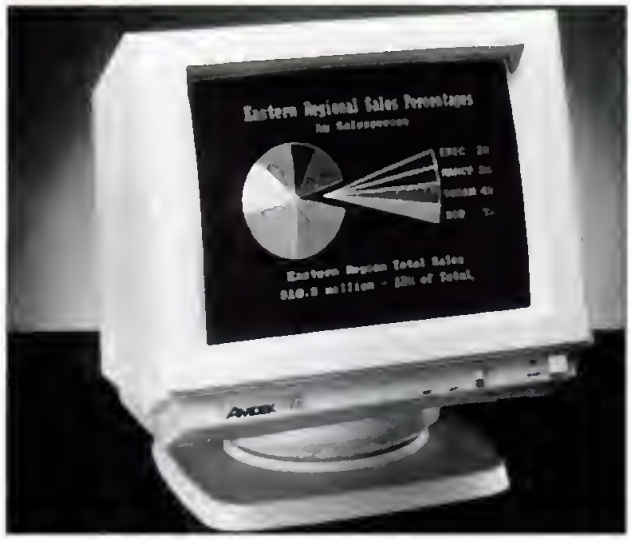
A new line of certified 100 percent error-free disks has been announced by Wabash DataTech Inc. The Pinnacle Series disks are backed by a lifetime guarantee and are packaged in an easel-backed case for easy disk access and permanent storage.

List Price: *Varies per disk type*
Wabash DataTech Inc.
2 Continental Towers, #400
1701 Golf Rd.
Rolling Meadows, IL 60008
(312) 593-6363

*Circle **649** on Reader Service Card*



Pinnacle Series Disks, *Wabash DataTech Inc.*



Amdek Color 722, Amdek Corp.

Amdek Color 722

Amdek's new high-resolution, dual-mode RGB color monitor is designed to support the IBM Enhanced Graphics Adapter and compatible video boards. It features an etched glass and nonglare screen with a .31-millimeter dot pitch and can accept the Enhanced Graphics Adapter dual-frequency output. With the board's slower cycle mode, the monitor fully emulates the IBM 5153 Color Display with a 640 by 200 line resolution of 16 colors. Driven by the Enhanced Graphics Adapter's faster cycle mode, the Color 722 provides graphics resolution of up to 620 by 350 lines, with 16 colors from a 64-color palette.

Other features of the Amdek Color 722 include front-mounted operator controls, with a special control to switch the monitor into full-color, green, or amber text mode. A matching tilt-and-swivel stand is available separately.

List Price: *$799; ST-1 Pedestal, $29*

Amdek Corp,
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 595-6890
Telex: 28-0803

*Circle **652** on Reader Service Card*

MicroTalker System

Microtel Inc. has announced a message store-and-retrieve system that can serve up to 300 users on four phone lines from a single IBM PC in its maximum configuration. The MicroTalker System provides each linked user with an individual message mailbox, an announcement message that can be changed at any time, and voice prompts that guide the caller through the process of leaving one or more messages on the computerized system.

A provision for message notification allows a user to individually define when and where the system can reach him to deliver a message left in his mailbox. Systems are available configured as a plug-in board for a single phone line and computer (MicroTalker I) up to a four-line integrated unit with dedicated PC-XT.

List Price: *$695–$19,800, depending upon the specific system.*

Microtel Inc.
40 W. 27th St., 4th floor
New York, NY 10001
(212) 684-4440

*Circle **646** on Reader Service Card*

Basic Concerto

Lotus Development Corp. and LeBlond Software Inc. have jointly announced a new program that allows software developers to create add-in software for *Symphony* using IBM BASIC. Add-ins are programs that attach Lotus's *Symphony* and enhance one of that program's five function areas—spreadsheet, word processing, database, graphics, and communications—or which provide a link to other programs or computer systems. *Basic Concerto* is designed to use the BASIC programming language as a means of modifying or customizing *Symphony* for a particular application.

List Price: *$99*
Requires: *512K RAM, two disk drives, DOS 2.0,* Symphony, *BASIC.*

LeBlond Software Inc.
2421 Willowbrook Pkwy., #507
Indianapolis, IN 46205
(800) 222-4711

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Freelance

Graphic Communications Inc. has produced a presentation graphics program capable of incorporating free-form images with standard business graphics for reports or presentations. *Freelance* can be used to enhance business charts created by the producer's own *Graphwriter* software, as well as by Lotus's *1-2-3* or *Symphony*.

Charts can be customized with comments, company logos, arrows, or specialized symbols and can be resized to fit in with other charts, images, or text. ASCII text files can be imported from any word processor and combined with graphics.

Freelance includes over 200 predrawn symbols, grouped into sets ranging from arrows and borders to architectural and demographic symbols. Free-form drawing aids include custom grids, rulers, and templates.

List Price: *$395*
Requires: *256K, one disk drive, PC-DOS, color/graphics adapter.*

Graphic Communications Inc.
200 Fifth Ave.
Waltham, MA 02254
(617) 890-8778

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Escribién

Ibersoft Inc. has announced the first spelling checker program for the Spanish language available for a variety of PC-based word processors. Called *Escribién*, the program is specifically designed to handle spelling problems unique to Spanish, such as gender and verb conjugation. This latter item is especially important, since each Spanish verb can take as many as 56 forms (as opposed to an English maximum of 3 or 4 forms per verb), which precludes the development of simple spelling checker algorithms with this language.

Versions of *Escribién* are available for *WordStar*, *MultiMate*, *WordPerfect*, and other word processors capable of producing ASCII files. A generic version with an installable ANSI driver for use with microcomputers that are not fully compatible with the IBM PC is also available from the producer.

List Price: *$99.95*
Requires: *128K, two disk drives, DOS 2.0 or later.*

Ibersoft Inc.
P.O. Box 3455
Trenton, NJ 08619
(609) 890-1496
TWX: 650-263-5518

*Circle **663** on Reader Service Card*



Escribién, Ibersoft Inc.

InfoWorld on EasyLAN
"Any product that brings down the cost and improves the ease of use for LANs is for the better."

Buy A Local Area Network For Less Than $100 Per PC

STOP buying expensive duplicate PC peripherals. Usually your peripherals just sit idle. If your office owns two or more PCs can you justify a costly printer and multiple disk drives for each PC? How often are your printers actually busy? Thirty minutes a day? An hour a day? Even your expensive hard disk is used infrequently.

The obvious solution to avoid expensive duplicate peripherals is a local area network that allows you to share printer and disk drives. But until now LANs have cost in excess of $1,000 per PC.

INTRODUCING THE *EasyLAN*™ OFFICE NETWORK

EasyLAN shares printers and disk drives between IBM PCs. *EasyLAN can save you $1000 or more per PC by eliminating duplicate equipment purchases.* *EasyLAN* advantages:

- ***EasyLAN* shares printers, disk drives, and information**
- **Easy to justify—less than $100 per PC**
- **Easy to install**
- **Easy to operate**
- **Easy to order**
- ***EasyLAN* performs in the background.**

EasyLAN's low price matches the small business user's cost-sensitive budget. It is the office network solution for less than $100 per PC including cables and software. At this price, the RISK IS LOW, and the BENEFITS ARE HIGH.

EasyLAN performs its operations concurrently in the background. *EasyLAN* communications, file transfers and printer operations all take place while each PC simultaneously performs such normal DOS applications as Lotus 1-2-3,™ WordStar™ and dBASE.™

EASY TO OPERATE

EasyLAN network software allows PC users to share printer and disk peripherals. PCs are connected by *EasyLAN* cables plugged directly into your PC's standard serial communication ports and *EasyLAN* can be used with digital PBXs. *EasyLAN* supports geographically separated PCs using modems and dial-up lines.

EasyLAN's performance meets your small office requirements to move word processing documents and spread sheets between PCs. For example, *EasyLAN* can move a 10 page document between two PCs, as a background operation, in less than one minute!

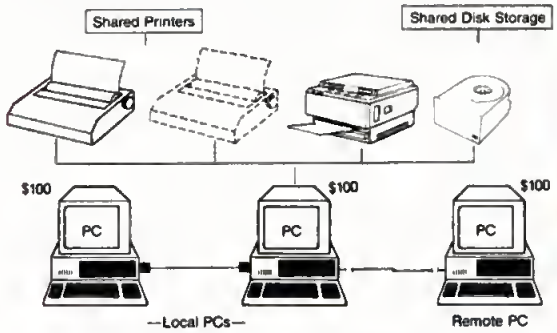
EasyLAN loads automatically at boot time. It manages the PC's serial and parallel ports for communications and printing. All *EasyLAN* operations may be started from any connected PC.

Printer sharing operates transparently with existing programs. Print files are automatically written to disk and scheduled for printing. Multiple printers per PC may be designated for specific office tasks.

For example, one PC can interface with Printer 1 for general purpose output, with Printer 2 for continuous-form letterhead stationery, and with Printer 3 for printing continuous-form invoices.

Disk sharing uses *EasyLAN's* COPY command, *EZCOPY,*™ to move files to and from PCs. Files are stored or retrieved from disk storage and the Directory is updated. *The high-capacity benefits of just one hard disk can now be shared by several PCs.*

All communication operations are protected by a unique password assigned to each PC so security is maintained.



***EasyLAN* Office Network**

EASY SPECIFICATIONS

Each PC in the network requires an individual copy of the *EasyLAN* software, 128k of memory, a serial communication port(s), and DOS 2.0 or above. For your convenience, *EasyLAN* diskettes are not copy protected. *EasyLAN* runs on all IBM PC models (PC, XT, AT, and Jr) and compatible PCs.

"I look for those products that make my job easier and save me and my company money. I believe EasyLAN does both."
Carl Warren
Editor, *Mini-Micro Systems*

EASY TO INSTALL

EasyLAN can be installed in less time than it takes to enjoy your coffee break. Just plug the *EasyLAN* cables into existing serial ports. *EasyLAN's* PRINT, COPY and DIRECTORY commands are very similar to DOS commands.

EASY TO ORDER

EasyLAN is immediately available and easy to order. For a two PC network, start with the *EasyLAN* Kit. For each additional PC in the network, order the *EasyLAN* Expansion Kit.

The *EasyLAN* Kits include program diskettes, manuals and cables, which are shielded to maintain signal quality. All parts are warranteed for one year. *EasyLAN* program diskettes may be purchased individually; you supply your own cables, modem links or PBX connections.

ORDER *EasyLAN* TODAY. 1-800-835-1515 Server Technology, Sunnyvale, CA 94086 408/738-8377

Name _____

Shipping Address _____

City _____

State _____ Zip _____

Telephone () _____

Payment: USA—Visa, MC, Check, PO No COD
Out of USA—US $ Bank Draft

Name on Credit Card _____

Credit Card No. _____

Card Expire Date _____

For Ordering or Configuration Help Call Toll Free
1-800/835-1515
In California call 408/738-8377 MasterCard and Visa Accepted

EasyLAN Order Form		Qty	Amount
EasyLAN Kit—for 2-PCs: One 30' Cable, Two Diskettes, and Manuals.	Price $179.95		$
EasyLAN Expansion Kit—for each additional PC: One 30' Cable, Diskette and Manual	Price $109.95		$
EasyLAN Diskette and Manual.	Price $ 79.95		$
EasyLAN Cable—30'	Price $ 49.95		$
Custom length cables. Call for quote.		CA resident tax 7%	$
		Shipping Charge: USA $5.00 Out of USA $15.00	$
TOTAL ORDER			$

1095 E. Duane, S107
Sunnyvale, CA 94086
408/738-8377

EasyLAN

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Incredible value!

Nashua™ Diskettes

LIFETIME WARRANTY!

85¢ ea. Qty 50 — 5¼" SSDD

97¢ ea. Qty 50 — 5¼" DSDD

These are poly-bagged diskettes packaged with Tyvek sleeves reinforced hubs, user identification labels and write-protect tabs. NASHUA Corporation is a half-billion dollar corporation and a recognized leader in magnetic media.

SOFT SECTOR ONLY! Sold in multiples of 50 only!

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DISK WORLD! Authorized Distributor — NASHUA MAGNETIC MEDIA

FANTASTIC LOW PRICES ON

BASF QUALIMETRIC DISKETTES!

LIFETIME WARRANTY!

Buy in bulk and save. 150 to the carton with envelopes, write-protect tabs and user ID labels. Boxed product is the same, except in cardboard boxes of 10.

	Qty. 50	Qty. 150
5.25" SSDD	83 ea	80 ea
5.25" DSDD	94 ea	92 ea
5.25" DSDD-HD	2.13 ea	N/A
5.25" SSDD-96TPI	94 ea	N/A
5.25" DSDD-96TPI	1.06 ea	N/A
3.50 SSDD-135TPI	1.84 ea	1.68 ea
3.50 DSDD-135TPI	2.40 ea	2.28 ea

NOTE: 3.50" diskettes in Quantity 50 are packed in plastic library cases. That's why they seem to be a better buy. But there are only 5 diskettes to a case... so the bulk diskettes are really a better deal, unless you like expensive little library cases.

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LIFETIME WARRANTY!

The best deal on 3M diskettes you've ever seen!

FREE!

FLIP 'N FILE 15 with every order for 5.25" SSDD and DSDD.



$1.36 ea. 5.25" SSDD with FREE Flip 'n File 15
5.25" DSDD with FREE Flip 'n File 15... **$1.67 ea.**
MINIMUM ORDER: 50 Diskettes
(Orders less than 50 are $1.39 and $1.70, respectively.)

100% LIFETIME WARRANTY!

This is a Super Special Promotion. It was supposed to end May 31, 1985.

But we decided to buy more than 1,000,000 3M diskettes packed in the FREE Flip 'n File 15...and give you the benefits of this terrific value.

One word of warning: this offer is limited only to supplies on hand. Once this inventory is gone, that's it. The prices stay the same...but there's no FREE Flip 'n File.

The last time we ran an offer like this, everything sold out in about six weeks.

So don't wait. Order now.

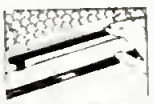
Other 3M diskettes

	Qty. 20	Qty. 50
5.25" SSDD-96TPI	$2.07 ea.	$2.04 ea.
5.25" DSDD-96TPI	$2.51 ea.	$2.48 ea.
5.25" DSDD-HD FOR AT	$3.18 ea.	$3.14 ea.
3.50"SSDD-135TPI (Mac)	$2.29 ea.	$2.26 ea.

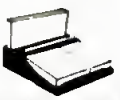
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100% certified 3M data cartridges

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You've used these diskettes hundreds of times... as copy-protected originals on some of the most popular software packages. They're packed in poly-bags of 25 with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs.

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Ordering & Shipping Instructions

Shipping: 5¼" & 3.5" DISKETTES—Add $3.00 per each 100 or fewer diskettes. **Other Items:** Add shipping charges as shown in addition to other shipping charges. **Payment:** VISA and MASTER CARD accepted. **COD Orders:** Add additional $5.00 Special Handling charge. **APO, FPO, AK, HI & PR Orders:** Include shipping charges as shown **and** additional 5% of total order amount to cover PAL and insurance. **Taxes:** Illinois residents only add 7% sales tax.

Prices subject to change without notice
This ad supercedes all other ads
Not responsible for typographical errors
MINIMUM TOTAL ORDER: $35.00

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Every once in a while, someone takes the simple and makes it elegant! This unit holds 50 5¼" diskettes, has grooves for easy stacking, inside nipples to keep diskettes from slipping and several other features. We like it!

$9.69 ea. + $2.00 Shpng.

DISKETTE 70 STORAGE: STILL A GREAT BUY.



Dust-free storage for 70 5¼" diskettes. Six dividers included. An excellent value.

$9.95 + $3.00 Shpng.

DISK CADDIES

The original flip-up holder for 10 5¼" diskettes. Beige or grey only.

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Introducing Super Star Diskettes: the high quality diskette with the lowest price and the best LIFETIME WARRANTY!

In the course of selling more than a million diskettes every month, we've learned something higher prices don't necessarily mean higher quality.

In fact, we've found that a good diskette manufacturer simply manufactures a good diskette...no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality.

The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits.

But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers.

Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5¼" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specificahons...specifications which are higher than most...and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Tyvec sleeves, reinforced hubs, user ID labels and write-protect tabs.

Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them...and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work time after time, every time. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

Super Star Diskettes. You already know how good they are. Now you can buy them...cheap.

Well, that's the story.

Super Star diskettes don't roll off the boat from Pago-Pago or emerge from a basement plant just east of Nowhere.

Super Star diskettes have been around for years...and you've used them for years as copy-protected software originals, unprotected originals. Sometimes, depending on which computer you own, the system master may have been on a Super Star diskette. And maybe more than once, you've bought a box or two or more of Super Star diskettes without knowing it. They just had some "big" company's name on them.

Super Star Diskettes are good. So good that a lot of major software publishers, computer manufacturers and other diskette marketers buy them in the tens or hundreds of thousands.

We buy them in the millions.

And than we sell them to you.

Cheap.

When every little bit counts, it's Super Star Diskettes.

You've used them a hundred times...under different names.

Now, you can buy the real McCoy, the same diskette that major software publishers, computer manufacturers and diskette marketers buy...and call their own.

We simply charge less.

Super Special!

Order 50 Super Star Diskettes and we'll be happy to sell you an Amaray Media-Mate 50 for only $8.75, shipping included...a lot less than the suggested retail price of $15.95.



Regular DISK WORLD! price: $9.69 ea. + $2.00 Shpng.

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DISK CADDIES

The original flip-up holder for 10 5¼" diskettes. Beige or Grey only.

$1.65 ea. + .20 Shpng.



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Dust-free storage for 70 5¼" diskettes. Six dividers included. An excellent value.

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INQUIRIES:
1-312-256-7140

FOR FASTEST SERVICE, USE NO-COST MCI MAIL. Our address is DISKORDER. It's a FREE MCI MAIL letter. No charge to you. (Situation permitting, we'll ship these orders in 24 hours or less.)

SHIPPING: 5¼" & 3½" DISKETTES—Add $3.00 per each 100 or fewer diskettes. **OTHER ITEMS:** Add shipping charges as shown in addition to other shipping charges. **PAYMENT:** VISA, MASTERCARD and Prepaid orders accepted. **COD ORDERS:** Add additional $5.00 special handling charge. **APO, FPO, AK, HI & PR ORDERS:** Include shipping charges as shown and additional 5% of total order amount to cover PAL and insurance. We ship only to United States addresses, except for those listed above. **TAXES:** Illinois residents, add 7% sales tax.

MINIMUM ORDER: $35.00

The Super Star LIFETIME WARRANTY!

Super Star Diskettes are unconditionally warranted against defects in original material and workmanship so long as owned by the original purchaser. Returns are simple: just send the defective diskettes with proof of purchase, postage-paid by you with a short explanation of the problem, and we'll send you the replacements. (Incidentally, coffee stained diskettes and diskettes with staples driven through them don't qualify as "defective".)

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256K Ram	each 2.50
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20MB Hard Drive w/Controller and Cables	449.00
10MB Tape Back Up Drive for XT	299.00
10MB Tape B/U Drive for AT	375.00
135 watt Power Supply	79.00
195 watt Power Supply	125.00
FDC with P/P, S/P, Clock & Game Port	99.00
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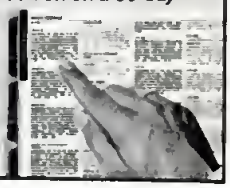
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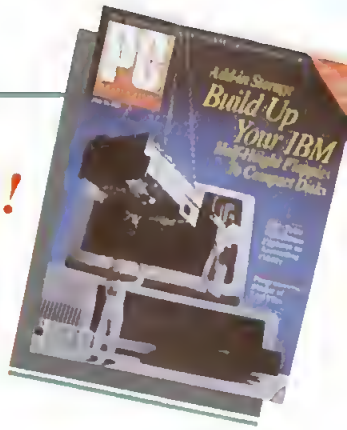
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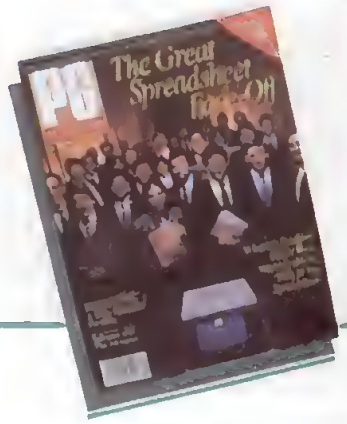
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Cursoring a Blue Streak

Is there a *PC Magazine* program listing that will let me customize the cursor's size and blinking from within my AUTOEXEC.BAT file? I've also seen some utilities that speed up the cursor, and I'd like to do that. If I do change the cursor, will other programs destroy the cursor configuration when they load? What's controlling the cursor, hardware, or software?

D. Pringle
Mount Pleasant, South Carolina

The cursor is hardware controlled on the PC, and there are only a limited number of things you can do with it. You can adjust its size, but you can't turn off the blink.

I'm sorry IBM didn't take the approach to the cursor in the PC that they implemented in their 3278 mainframe terminals. In these terminals, three key combinations are devoted to controlling the cursor: selecting box or line, blinking or not blinking, and clicking or nonclicking.

Among IBM mainframe users, I found you could deduce a person's computer-experience level by the type of cursor he or she used. Data processing veterans used a silent nonblinking underline, while a clicking, blinking box was obviously the sign of a programmer trainee.

The size of the cursor on the PC can be controlled by ports on the 6845 video controller chip. It's easier to use the BIOS Interrupt 10h function call 01h, however. Figure 1 shows an assembly language program called CURSOR.COM that you enter using DEBUG and that will let you experiment with different cursor sizes. (You don't have to type in the semicolons and the comments that follow them—DEBUG will ignore them.) The program takes two arguments (each a 2-digit hexadecimal number) to specify the top scan line and the bottom scan line of the cursor. You can start by entering the following commands, depending on whether you have a monochrome or color/graphics display:

Monochrome Normal:	CURSOR ØB ØC
Monochrome Box:	CURSOR ØØ ØC
Color Normal:	CURSOR Ø6 Ø7
Color Box:	CURSOR ØØ Ø7

Using CURSOR.COM to experiment with cursor size is better than using the BASIC LOCATE statement because you can go beyond IF hexadecimal (or 31 decimal) in the arguments. You may notice through experimentation that the blink is slowed down somewhat by values of 6x (for instance, CURSOR 66 67), but it cannot be turned off entirely.

Whether other programs will destroy your settings depends on the program. Some do, some don't. Try them out.

What about those programs that use a nonblinking cursor? What you're seeing when you run them is actually not the hardware-generated cursor. Programs can hide the real hardware cursor and then create their own "cursor" by writing the characters to the display with a reverse-video attribute.

Mimicking this process in a remain-resident utility is not entirely successful. A while ago I worked on a resident utility that intercepted all the BIOS Interrupt 10h calls to substitute a reverse-video screen attribute for the blinking cursor. This worked fine at the DOS-command level, but it was an absolute mess with some other programs. For instance, WordStar *3.30 uses the BIOS services to set the cursor position, but it uses direct memory to write to the screen and scroll it. This resulted in multiple copies of my "cursor" appearing all over the screen!*

Resident utilities that speed up the cursor are really keyboard programs. These programs check the keyboard for cursor-movement keys and then use the PC internal clock to put additional keystrokes into the keyboard buffer in addition to those

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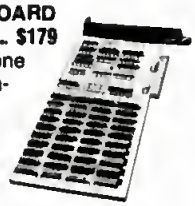
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```
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-A
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XXXX:0103 CALL    0116           ; Call ASC2HEX
XXXX:0106 MOV     CH,AL          ; Save in CH
XXXX:0108 MOV     AX,[006D]      ; 2nd Parameter
XXXX:010B CALL    0116           ; Call CONVERT
XXXX:010E MOV     CL,AL          ; Save in CL
XXXX:0110 MOV     AH,01          ; Set Cursor
XXXX:0112 INT     10             ;   through BIOS
XXXX:0114 INT     20             ; Terminate
XXXX:0116 CALL    0125           ; ASC2HEX:
XXXX:0119 XCHG    AL,AH          ;   Subroutine to
XXXX:011B CALL    0125           ;   convert ASCII
XXXX:011E MOV     CL,04          ;   digits in AX
XXXX:0120 SHL     AH,CL          ;   to one-byte
XXXX:0122 ADD     AL,AH          ;   value in AL
XXXX:0124 RET
XXXX:0125 OR      AL,20          ; ASC2HEX: Converts
XXXX:0127 SUB     AL,57          ;   one ASCII digit
XXXX:0129 JNB     012D           ;   to hexadecimal
XXXX:012B ADD     AL,27
XXXX:012D RET
XXXX:012E
-N CURSOR.COM
-R CX
CX 0000
:002E
-W
Writing 002E bytes
-Q
```

Figure 1: *Using DEBUG to create CURSOR.COM, a program to set different cursor sizes.*

generated by the typematic action of the keyboard. I used a public-domain program called SPEEDKEY *(available on many computer bulletin boards) for a little while, but most other programs couldn't keep up with the speed. Usually only word processors and spreadsheets require a lot of cursor action, and they have key combinations built in to get the cursor around quickly anyway.*

In Search of Lost Time

I have an IBM PC-XT that does not have the clock/calendar option. I am interested in upgrading my computer to include this feature. Is there a retrofit kit or chip available that I can obtain to add this clock/calendar feature? I do not want to scrap the existing computer board if at all possible.

Michael I. Herman
New York, New York

Although the PC and XT keep track of the time of day (provided you set it correctly), neither machine has ever had a clock/calendar option with battery backup. In the PC family, such a built-in clock is standard only on the PC AT.

Many multifunction/memory expansion boards contain a clock chip with battery backup. You can also buy an expansion board containing only a clock for about $50 to $100. (I count six of them listed in the Fall 1985 PC Buyers Guide.*) These are generally small boards that can fit in one of the short slots inside the PC-XT. The boards usually come with some software to set the clock.*

Because it's so tempting to just hit the Enter key when DOS asks for the date and time, people without hardware clocks end up with a lot of files seemingly created in the wee hours of January 1, 1980. While annoying in a home setup, this situation is intolerable in a business environment.

PC users and their supervisors tired of

```
DEBUG
-A
XXXX:0100 MOV  AH,2A            ; Get Date
XXXX:0102 INT  21               ;   through DOS
XXXX:0104 MOV  AX,CX            ; Year
XXXX:0106 SUB  AX,7BC           ; 1980 in Hex
XXXX:0109 MOV  AH,4C            ; Exit with error
XXXX:010B INT  21               ;   code through DOS
XXXX:010D
-N DATECHK.COM
-R CX
CX 0000
:000D
-W
Writing 000D bytes
-Q
```

Figure 2. *Using DEBUG to create DATECHK.COM. An ERRORLEVEL of 0 is returned if the date is set for 1980.*

seeing lists of files dated 1/1/80 might want to create the DATECHK.COM file shown in Figure 2. DATECHK.COM returns an "error" code that equals the year set in DOS minus 1980. The batch file fragment shown below, which you can add to your AUTOEXEC.BAT file to run when you boot up, uses this error code with an ERRORLEVEL check to continually ask for the date if it's still set at 1980.

```
Echo Off
Cls
:GETDATE
Date
Datechk
If Errorlevel 1 Goto GOODDATE
Echo Gimme a break --
Echo      It's not 1980 anymore.
Goto GETDATE
:GOODDATE
```

Some PC users may be annoyed, but it's for their own good.

Air Conditioner Zaps

Last summer I lost several files during saves or while copying that apparently took place at the wrong moment in my air conditioner's cycle. Although the directories were not harmed, the files ended up scrambled on the disk.

I'm using a PC with two floppies, a RAMdisk, a monochrome display, an uninterruptible power supply, and a surge suppressor. The trouble seems to occur between the RAMdisk and drive B:. I also noticed that the surge protector's red light went on and emitted a hum, and the characters quivered on the screen when the air conditioner was on.

Any suggestions for next summer?

Theodore A. Lobsenz
Hawthorne, New Jersey

The fact that your uninterruptible power supply (UPS) is not giving you uninterruptible power is not a good sign. Try removing the surge protector from the configuration. Your UPS has its own, and a second may be interfering with it.

But most importantly, your air conditioner and PC should not be on the same circuit. The air conditioner should have its own circuit. Even if the UPS supplies enough power to the PC when the air conditioner cranks up, it puts a lot of strain on the unit and may hasten its demise.

The quivering of the characters on the monochrome display is due to common RF (radio frequency) interference. Sometimes even disk drives or the proximity of a second color monitor can make the monochrome quiver. Isolating the circuits of the air conditioner and PC should also solve this problem. Have an electrician install a separate circuit for the PC so you won't have to choose between cooling and computing next summer.

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PC Product Index

RS#	PRODUCT	ADVERTISER	PAGE#
ACCOUNTING SOFTWARE			
472	Accounting Solution	Business Tools, Inc.	57
476	Accounting Software	DAC Software.	19
260	Lotus Software	H & E Computronics	360
168	Accounting Software	MCBS	241
115	Rose Software	Rose Associates	307
•	Accounting For Micros	The James River Group	278
INTEGRATED ACCOUNTING PACKAGES			
263	Intgrted Acctng Packages	Macola Inc.	54
TAX AIDS			
524	Tax Program	Rockware Data Corporation	293
COMMUNICATIONS SOFTWARE			
326	Crosstalk XVI	Micro Stuf Inc	70-71
275	Mex PC	Nightowl Software Inc.	275
TERMINAL EMULATORS			
365	Smarterm	Persoft	5
OTHER UTILITIES			
139	Facelift	Companion Software	21
•	Utilities SW	American Communication Arts	256
FINANCIAL PLANNING SOFTWARE			
497	Personal Finance Master	Spectrum Software	304
151	Managing Your Money	MECA (Micro Education Corporation of America)	18
177	"Value Screen" Portfolio Manager	Value Line Inc	227
162	Calc Result	Handic Software	239
GRAPHICS SOFTWARE			
482	monoGRAPHYX	Analytics International Inc.	295
122	Gift of Sight	Data Copy	260
506	Generic Cadd	Generic Software	294
311	In-A-Vision	Micrografx	62
473	PC Paintbrush	Z-Soft	308
135	Graphics Software	Spectrum Holobyte, Inc	163
INFORMATION MANAGERS			
180	File Connection	Flagstaff Engineering	30
103	"Pop-Ups"	Bellesoft	11
PROJECT MANAGERS			
187	Project Planner	Primavera Systems	244
•	Project Scheduler Network	Scitor Corp	214
OTHER INFORMATION MANAGERS			
•	Little Black Book	Cygnet Technology	358
SOFTWARE FOR PROFESSIONALS			
147	Superkey & Sidekick	Borland International	183
147	Superkey & Sidekick	Borland International	183
348	Business Builder	BPI Systems Inc	95
125	Software	Conroy La-Pointe	45
526	GEM	Digital Research	59
159	8087 Support	Microway	26
ENGINEERS/SCIENTISTS			
119	8087 Mathpak	Hauppauge	10
343	Scientific Calculator	K Software Hoove	305
ARTIFICIAL INTELLIGENCE SOFTWARE			
159	8087 Support	Microway	26
WORD PROCESSING SOFTWARE			
476	Word Processing	DAC Software	19
249	Q&A	Symantec	172-173
250	Q&A	Symantec	174-175
251	Q&A	Symantec	176-177
518	XyWrite	XyQuest	309
WORD PROCESSING AIDS			
475	Rightwriter WP Aid	Decision Ware	92
378	Polaris PrintMerge	Polaris	246
376	Reference Set Pop Up Thesaurus and Dictionary	Reference	79
	Word Perfect	Satellite Software International	32
222	Linkage, Model 404, W-Link, Text Com, Software Bridge	Systems Compatibility Corp	240
140	Whoops! Real-Time Speller	Cornucopia	42

RS#	PRODUCT	ADVERTISER	PAGE#
MULTIFUNCTION SOFTWARE			
144	Public Domain Software	PC Software Interest Group	261
528	Free Public Domain Software	Public Domain Software	261
•	Arborist Soft	Texas Instruments	232
TYPESETTING SOFTWARE			
302	Le Print	Lebaugh Software	358
EDUCATION SOFTWARE			
494	Ortho	Chevron Chemical	223
INTEGRATED SOFTWARE			
337	Integrated Soft	Migent	262
520	Reflex	Borland International	185
249	Q&A	Symantec Corporation	172-173, 174-175, 176-177, 249,250,251
•	Consultant Software	Texas Instruments	274
ENTERTAINMENT SOFTWARE			
522	Greeting Card	Computer Greeting	309
470	ICON: Quest for the Ring	Macrocom	272
•	DOS Flight Simulator	Microsoft	268
LANGUAGES			
531	Intro C	Computer Innovations	240
COMPILERS			
142	Holiday Packs	Borland International	2-3
249	Q&A	Symantec Corporation	172-173, 174-175, 176-177, 249,250,251
113	C-Compilers	Lattice, Inc	351
PROGRAMMER'S TOOLS			
310,312	Programmers Tools	PC Brand	279-281
310,312	Programmers Tools	PC Brand	279-281
529	Screen Sculptor	Software Bottling	271
156	APL Plus	STSC	90
DATA BASE MANAGERS			
234	GP Tools dBASE Manager	Allen Harris Industries	302
218	Revelation	Cosmos, Inc	82
•	Database Manager	Potomac & Pacific Engineering	4
390	Software/Data Mgt	Softwest Programming	324
FORMS EDITOR			
515	FormTool	Bloc Development	27
PROGRAM DEVELOPER/GENERATOR TOOLS			
247	d-BASE III Power Tools	Fox & Geller	56
486	Turbo Plus	Nostradamus	84
530	Flashcode	Software Bottling	273
214	Better Basic	Summit Software	85
113	Lattice Topview Tool Basket	Lattice, Inc	351
TEXT EDITORS			
184	SPF/PC	Command Technology Corp	350
113	Texas Management Utilities	Lattice, Inc	351
OTHER UTILITIES			
370	DOS Partner	Allied Computer Group	297
496	Locksmith/PC	Alpha Logic Business Systems	299
509	The 1DIR	Bourbaki	78
155	PC Tools	Central Point Software	270
105	Diskette by Ford Software Utilities	Ford Software	103
317	Sideways	Funk Software	98
525	Padlock II	Glenco Engineering	300
113	C-Food Smorgasborg, C-Sprite, dBC, Pane I	Lattice, Inc	351
340	Disc Mechanic	MLI Microsystems	294
346	Norton Utilities	Norton Utilities, The	246
486	Screen-Genie, Turbo Spawn	Nostradamus, Inc.	84
489	Lightning	Portable Computer Support Grp	22
179	Pro Key	Rose Soft	1
153	Utilities	Westlake Data	356
HARDWARE			
125	Hardware	Conroy LaPointe	45
371	ATI-1000 ATI-2000	Atronics International	359
159	Number Smasher	MicroWay	267

PC Product Index

RS#	PRODUCT	ADVERTISER	PAGE#
ACCESSORY CARDS			
159	Number Smasher	MicroWay	267
155	PC Option	Central Point Software	270
125	Multifunction Board	Conroy LaPointe	45
IBM PC COMPATIBLE COMPUTERS			
*	SAM 3001	Hi Tech International	266
328	IBM Compatible	Tech PC	290
481	IBM Compatible & Accessories	Hi-Tech Computers & Electmcs	238
320	PC88 & PC286	Gulfstream Micro Systems	297
130	PC Product Lime	IBM Entry Systems Division	49-52
270	PC-AT	IBM Entry Systems Division	248-249
375	BT AT, BT YT	Basic Time	97
299	PC Xtra	ITT Information Systems	164
MULTIFUNCTION BOARD			
357	All Card	All Computers	12-13
104	AST 5251	AST Research	158-159
375	Expansion Board	Basic Time	97
502	Circuit Boards	Computer Peripherals	16
485	Econaram	Magnum Computer Inc.	325
478	Accent	Maynard Electronics	39
189	Quad Silver Board	Quadram Corp	213
179	Quad Gold Board	Quadram Corp.	488
VIDEO/GRAPHICS BOARD			
341	Graphic Solution	Array Technologies Inc	225
371	Enhanced Graphics Adaptor	Atronics International Inc.	359
238	Genoa Spectrum	Genoa Systems Corp.	96
146	Hercules Color Card	Hercules Computer Technology	166
145	Hercules Graphic Card	Hercules Computer Technology	203
*	Modular Graphics Card	Paradise Systems	242-243
523	Egaboard	Rix Soft Work Inc.	327
347	Color 400	Sigma Designs	250
517	Chauffer	STB Systems	C-3
EXPANSION UNITS			
480	PC-AT Optimizer	Micro Advanced Systems	222
125	Expansion Units	Conroy LaPointe	45
*	8087 Support	MicroWay	26
INPUT HARDWARE			
202	Logimouse C-7	Logitech	282
375	Keyboards	Basic Time	97
240	"Pronounce" Speech Input System	Microphonics	276
277	Pronounce	Microphonics	277
111	Summa Mouse Summa Sketch	Summa Graphics	225
ACCESSORIES			
*	Curtis Accessories	Curtis Manufacturing	64
389	Accessories	MegaHertz Corp.	305
273	PC Tonl Kit	Logistics Data System	324
MASS STORAGE HARDWARE			
198	Pre Cursor	David Aldridge Co.	29
375	Hard Drives, Tape Backup	Basic Time	97
*	Hard Disk and Tape Backup	Emerald Systems Corp.	170-171
511	Re Intro	Emulex-Persyst	303
383	Tape Backup & Hard Disk	Express Systems, Inc.	186-187
143	9-Track Magnetic Tape Subsystem	IBEX.	309
335	Disk Storage	Kustom Electronics	310
498	Bakup	Software Integration	312
*	QIK File	Sysgen Inc	60
492	Mass Storage Hardware	J & M Systems	2-4
501	QIC-60	Tecmar	C-2

RS#	PRODUCT	ADVERTISER	PAGE#
COMMUNICATIONS HARDWARE			
163	Hayes 2400 Modem	Hayes Microcomputer Products	20
MODEM			
364	PC Modem Half Card	Ven-Tel	14
375	Internal, External	Basic Time	97
NETWORKING			
165	LAN Network	Prolan Inc	23
519	Easy LAN	Server Technology	321
393	LANLink	Software Link, Inc.	40-41
393	MultiAdvanced	Software Link, Inc.	40-41
OTHER COMMUNICATIONS HARDWARE			
286	Trac Ball Link	Disc Instruments	165
DISPLAYS/MONITORS			
374	Computer Monitor	Gold Star Electronics	239
149	Princeton Monitors	Princeton Graphics	108-109
149	Princeton Monitors	Princeton Graphics	108-109
527	Tatung Color Monitor	Tatung	348
375	Monitors	Basic Time	97
PRINTERS			
213	Printers	Canon USA Inc	142-143
125	Printers	Conroy LaPointe	45
373	Mail Order Printers	International Marketing Group	269
FONTS			
477	LQ	Granny's Old Fashioned SW	294
303	Letrex	Hammerlab	210
301	Fontasy	Prosoft	47
PRINTER DRIVERS			
175	Printer Boss	Connecticut Software	63
303	Lettrix	Hammerlab	210
FURNITURE			
484	Computer Furniture	Simonton Industries	87
DISKETTES			
*	Diskettes	BASF	105
*	Diskettes	BASF	104
125	Diskette	Conroy LaPointe	45
344	Mail Order Diskettes	Disk World!	322-323
*	Diskettes	Diskette Connection, The	297
510	Floppy Disk	Verbatim	265
ACCESSORIES			
118	Accessories	C-Thru Products	103
213	Power Protection	Computer Accessories	142-143
*	Curtis Accessories	Curtis Manufacturing	C-4
KEYBOARD OVERLAYS			
493	Info Plates	Interstate Software	226
*	PC Documate	Systems Management Assoc.	263
OTHER SUPPLIES			
*	Software Guide	Look-Up Corporation	31
388	Other Supplies	Sunny International	298
353	Power Maker	Topaz	212
LITERATURE			
474	Complete Handbook of Personal	St. Martins Press	178
ORGANIZATIONS AND SERVICES			
332	Micro Rentals	National Microrentals, Inc	226
226	Compuserve Information Service	Compuserve	235
*	The Source	Source Telecomputing	289

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Two Tutorials for dBASE III

A tutorial for novices helps fill in the gaps in dBASE III's manual and on-line help system, while a guide for dBASE III programmers offers tips on developing applications.

dBASE II's difficult user interface is legendary. Although Ashton-Tate's original database management system offered flexibility and processing power, its two-part manual gave novices very little sympathetic hand-holding. New users had to suffer through a long and painful apprenticeship learning the quirks and eccentricities of *dBASE II*'s programming language. The prospect was often enough to turn users away in favor of a lesser program.

A legion of *dBASE II* guides and tutorials quickly came forward to fill the information gap and the shelves of software dealers and bookstores. Some of these guides were excellent, but many of them were not worth the effort it took to read them. All purported to take the mystery and the sweat out of learning *dBASE II*.

Then Ashton-Tate designed a new version of its DBMS to be easier to learn and use than any comparable package on the market. The new release was to be more powerful than its predecessor. Novice *dBASE III* users need only ask the program itself for assistance. Few programs incorporate as much on-line help.

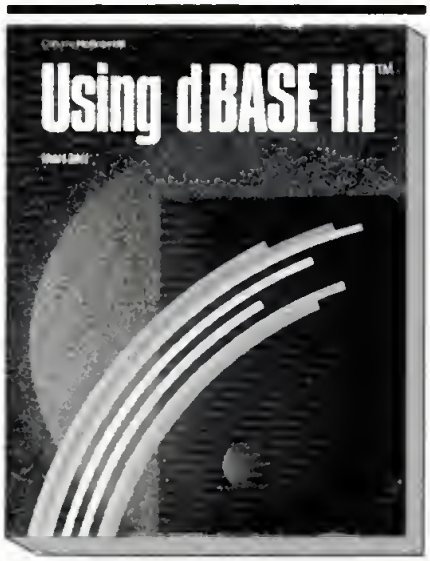
Yet publishers continue to produce tutorials. Are they really needed? Here are two very different answers.

FACT FILE

Using dBASE III
Edward Jones
Osborne/McGraw-Hill
2600 Tenth St.
Berkeley, CA 94710
Copyright: 1985
Cover Price: $17.95
ISBN: 0-88134-162-2
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Using dBASE III

This guide from Osborne/McGraw-Hill is entirely new, not, as I expected, simply a rewrite of the publisher's older *Using dBASE II*. (For a look at the first book and others like it, see "Judging the Guides: Here Come dBASics," *PC Magazine*, Volume 3 Number 2.) Author Edward Jones assumes you're starting out fresh with *dBASE III* and begins his tutorial at the most elementary level of database design and use. It takes you step by step from an initial, general discussion of databases through *dBASE III*'s features and limitations, using the creation and manipulation of data files for the fictitious ABC Realty Co. as examples. He draws other examples from the day-to-day needs of small companies like ABC Realty to guide you through the creation of personnel files, a payroll system, customer records with accounting reports, and similar applications.



The book's language is clear and concise throughout, and the subject matter is organized logically, building more difficult tasks upon easier material covered earlier in the book. However, since Ashton-Tate did go to considerable lengths to make *dBASE III* usable right out of the box, the tutorial's pacing seems slower than necessary. Little mention is made of *dBASE III*'s menu-driven *ASSIST* utility—a complete user shell simplifying all major operations of the program—or its context-sensitive help system. The opening chapters could have been cut considerably had the author acknowledged these features.

Unfortunately, *Using dBASE III* approaches command file programming solely in an introductory fashion. It gives only a cursory, general examination of programming elements with some samples of simple accounting programs you can adapt to your particular needs. It does give clear warnings about common programming pitfalls, which are sometimes overlooked in other tutorials. The book, however, does not go beyond the basics of putting a command file together, and offers few of the programming tricks that have turned other tutorials into a worthwhile read for novice and advanced users alike. As a basic how-to book for *dBASE III*, *Using dBASE III* fulfills its promise. It fills in some areas left vague by Ashton-Tate's manual with concrete usage examples and workable program samples.

The book has only one appendix, a glossary of *dBASE III* commands that duplicates Ashton-Tate's own summaries in

a more informal, yet neatly organized, fashion. In addition, the author shows in sufficient detail how you can interface *dBASE III* with other popular programs such as *1-2-3* and *WordStar*, as well as with such add-on, third-party utility packages as *dUTIL III* and *QUICKCODE III*.

Aside from a few minor errors (for example, *K*—as in *64K*—is defined as 1,000 bytes instead of 1,024 bytes), *Using dBASE III* is generally a solid work that will have you confidently using the software in a very short time.

dBASE III for the Programmer

If you already know enough of *dBASE III*'s basics to get by, you might want to tackle more-advanced areas of database programming than are generally covered in run-of-the-mill software "how-to" books. *dBASE III for the Programmer*, by Nelson T. Dinerstein, assumes you are already familiar with some programming language, preferably but not necessarily *dBASE II*. Here the fundamentals of *dBASE* data file structures and command syntax are covered quickly in alphabetical order, with short passages followed by examples of command and function usage.

Dinerstein's book is not so much a replacement for as a supplement to the Ashton-Tate manual. Where *dBASE III*'s own manual covers a topic in detail, it's treated lightly here; where the manual skimps on a topic, it's treated here in detail. The book's first six chapters move rapidly through the creation and basic manipulation of *dBASE III* data files—so quickly, in fact, that you can probably skip the first two altogether. They cover very little that isn't more fully covered by the *dBASE III* manual or built-in help and *ASSIST* facilities.

Instead of the usual drawn-out examples of how to handle everyday business situations, the author simply tells you what to do in a situation and quickly moves on to more-advanced topics. Throughout the book, Dinerstein does not hesitate to give his opinion of the best method to use to meet a particular programming situation, often without explanation.

The book is structured following a reference-book outline that treats each subject in terse, numbered paragraphs. The language is clear but not colloquial, and you

PC FACT FILE

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occasionally have to stop and reread something to make sure that you understand the concepts. Dinerstein's strict adherence to his outline-based organization precludes lengthy discussions of any particular topic—the author often prefers to repeat material in different sections rather than treat a topic completely in one section and refer to that section as needed in other parts of the book. Although this method means you can look up a subject quickly in the index, to get a full treatment of the topic you need to read all of the pages it references.

Most of the latter half of the book is devoted to advanced design principles in programming. As its name implies, *dBASE II for the Programmer* is not a book for someone planning to use the program solely to store names and addresses; it's for the budding programmer planning to write applications in *dBASE III* professionally.

Dinerstein extensively covers strategies for planning and programming a complex application with *dBASE III*; he emphasizes throughout the importance of following a generally accepted programming style. Chapter 7, for example, discusses at length methods for analyzing a business system. Instead of merely duplicating the business's existing system, Dinerstein teaches you to identify the problem that the system was created to solve. Often, such an analysis results in a finished application that takes an entirely different approach to the task at hand.

If you have an existing application in *dBASE II* that you wish to convert to *III*, you'll find *dBASE III for the Programmer* very helpful. It treats you to a step-by-step listing of the differences between the two programs and the methods you can follow to make a successful conversion. As in other sections, the material is in short, numbered passages detailing particular areas of conflict between the two programs.

If you're a bit leery of *dBASE III* and just want to learn enough to get started, you would be better served by Osborne/McGraw-Hill's *Using dBASE III*. If, however, you're ready to take on more complex applications programming, *dBASE III for the Programmer* will help you refine your skills while saving you the cost of tuition. This book makes a good shelf companion to the *dBASE III* manual, although I cannot recommend it as a thorough tutorial because of the terseness with which it covers the topics.

Despite what software producers have done to make their programs easier to use, dealers will clearly continue to need additional shelf space for third-party tutorials. Both of these books serve useful purposes in supplementing or replacing the Ashton-Tate manual, albeit for different groups of users. ■

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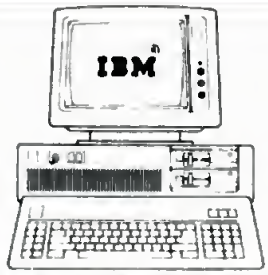
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496	Alpha Logic Business Systems	299
*	American Communication Arts	256
507	American Micro Technology	324
482	Analytics International	295
114	Arlington Computer Products	311
341	Array Technologies	225
104	AST Research, Inc.	158-159
371	Atronics International	359
*	BASF	105
*	BASF	104
107	Bay Express	283
515	Bloc Development	27
142	Borland International	2-3
147	Borland International	183
520	Borland International	185
509	Bourbaki, Inc	78
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218	Cosmos	82
*	Curtis Manufacturing	C4
*	Cygnet Technology	358
148	Dac Software, Inc.	17
476	Dac Software, Inc.	19
*	Daisy Graphics	256
122	Data Copy	260
198	David Alridge Co.	29
475	Decision Ware	92
526	Digital Research	59
286	Disc Instruments	165
516	Discount Computer Centers	258
108	Discount Microsales	264
109	Discount Microsales	86
*	Diskette Connection, The	297
315	Disk World!, Inc	322
244	Disk World!, Inc	323
491	Electro-Comp	28
*	Emerald Systems	170-171
511	Emulex-Persyst	303
383	Express Systems	186-187
180	Flagstaff Engineering	30
242	47st Computer	74-75
105	Ford Software	103
247	Fox & Geller	56
317	Funk Software	98
319	Garden of Eden	94
255	Gem Electronics	326
266	General Technology	106
506	Generic Software	294
238	Genoa Systems	96
525	Glenco Engineering	300
374	Gold Star Electronics	239
477	Granny's Old Fashioned Software	294
320	Gulfstream Microsystems	297
260	H&E Computronics	360
303	Hammerlab	210
162	Handic Software	211
119	Hauppauge Computer Works	10
163	Hayes Microcomputer	20
146	Hercules Computer Technology	166
145	Hercules Computer Technology	203
*	Hi Tech International	266
481	Hi-Tech Computers & Electronics	238
143	Ibex Computer Corp	309
270	IBM Entry Division	248-249
130	IBM Entry Division	49-52
493	Interstate Software	226
299	ITT Information Systems	164
*	James River Group	278
492	J & M Systems	294
343	K Software House	305
335	Kustom Electronics	310
113	Lattice	351
302	Lebaugh Software Corp.	358
282	Logicsoft	100-102
273	Logistics Data System	324
202	Logitech	282
*	Look-Up Corp	31
470	Macrocom Inc.	272
263	Macola Inc.	54
485	Magnum Computer	325
367	Magnum PC	288
237	Main Street Computer	110-111
276	Matrix Instruments Inc	213
478	Maynard Electronics	39
168	MCBS	241
151	MECA	18
389	Megahertz	305
480	Micro Advanced Systems	222
326	Microstuf	70-71
311	Micrografx	62
133	Micro Mart	64-65
240	Microphonics	276

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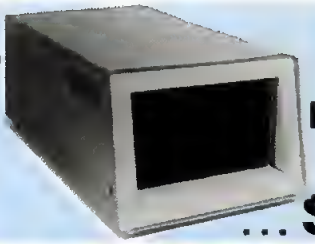


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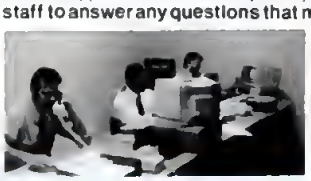
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RS #	Advertisers	Page
521	Microphonics	277
332	Microrentals	226
*	Microsoft	268
159	MicroWay, Inc.	267
*	Microway	26
337	Migent Technology	262
208	Minority Hi Tech Industries	306
340	MLI Microsystems	294
278	MRP Processing of Vertek	193
275	Nightowl Software	275
126	Northeastern Software	24-25
346	Norton Utilities	246
486	Nostradamus	84
514	One Computer Corp	287
494	Ortho Information Systems	223
363	Oryx Systems	218-219
*	Paradise Systems	242-243
204	PC America	80
310	PC Brand	279
312	PC Brand	280-281
339	PC Connection	196-201
245	PC Network	144
*	PC Network	151-156
471	PC's Limited	36-37
179	PC's Limited	69
144	PC Software Interest Group	261
365	Persoft	5
378	Polaris	246
103	Popular Programs	11
489	Portable Computer Support Group	22
*	Potomac Pacific Engineering Inc.	4
187	Primavera Systems, Inc.	244
*	Princeton Graphics	107
149	Princeton Graphic Systems	108-109
196	Princeton Graphics	301
373	Printers Plus	269
309	Progressive Micro Distributors	72-73
165	Prolan	23
301	Prosoft	47
528	Public Domain Software	261
488	Quadram	179
354	Qubié	53
483	Qubié	8-9
375	Qubié	97
376	Reference	79
523	RIX Softwork, Inc.	327
524	Rockware Data Corp.	293
115	Rose Associates	307
129	Rose Soft	1
512	Satellite Software International	32
*	Scitor Corp	214
519	Server Technology	321
347	Sigma Designs	250
484	Simonton Industries	87
*	Softline	81
529	Software Bottling Company	271
530	Software Bottling Company	273
498	Software Integration	312
393	Software Link, Inc.	40-41
390	Softwest Programming	324
*	Source Telecomputing	289
135	Spectrum Holobyte	163
497	Spectrum Software	304
474	St Martin's Press	178
517	STB Systems	C-3
156	STSC Software	90
111	Summa Graphics	255
214	Summit Software	85
388	Sunny International	298
249	Symantec	172-173
250	Symantec	174-175
251	Symantec	176-177
*	Sysgen Industries	60
222	Systems Compatibility Corp.	240
*	Systems Management Associates	263
527	Tatung	348
328	Tech PC	290
501	Tecmar Inc.	C2
170	Telasoft	see Telemart
170	Telemart	316
160	Telesolutions	66
*	Texas Instruments	232
*	Texas Instruments	274
353	Topaz	212
177	Value Line	227
364	Ventel	14
510	Verbatim	265
*	Warehouse Data Products	44
153	Westlake Data Corp	356
518	XY Quest Inc.	309
473	Z Soft	308

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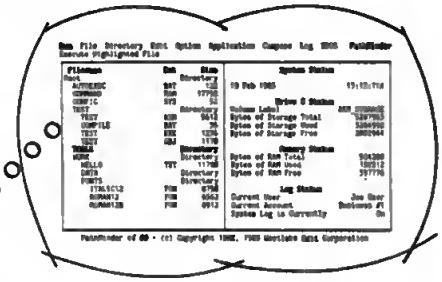
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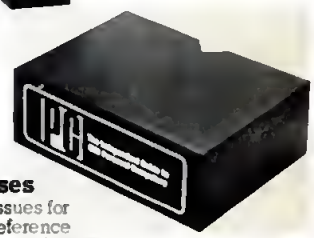
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For this cover story, *PC Magazine* plotter expert Glenn Hart rigorously tested and reviewed 24 plotters in all shapes and sizes: flatbed, drum, and roller bed. Leaving no stone in the market untumed, PC Magazine Labs evaluated plotters priced from $399 to $5,950; for easy reference, the reviews are arranged in ascending price order. Compare the reviews. Check out the fact-filled charts. Once again *PC Magazine* gives you the most informative and comprehensive product roundup available.

FORTRAN-77 Compilers

FORTRAN used to be a dark-horse language among PC programmers, but recent advances in the quality and performance of FORTRAN compilers have created a resurgence of interest in its use. Continuing to track the growing importance of PC programming in business, Chris Wolf tests three top FORTRAN compilers against the PC Magazine Labs standard language benchmarks, evaluating them for speed, conciseness of code, and the features they offer.

The NEC V-Series Chips

A new powerhouse is appearing on the chip-manufacturing scene: Nippon Electric Corp. Its V20 and V30 central processing units are faster, contain more built-in instructions, and use less power than either the Intel 8088 chip, which drives the IBM PC, or the 8086, which sits at the heart of the COMPAQ Deskpro, among many others. Yet, these chips remain fully compatible with their Intel counterparts, making them an easy and inexpensive way to turbocharge your 8088- or 8086-based computer. How do they do it? Stephen R. Davis gives you the inside story.

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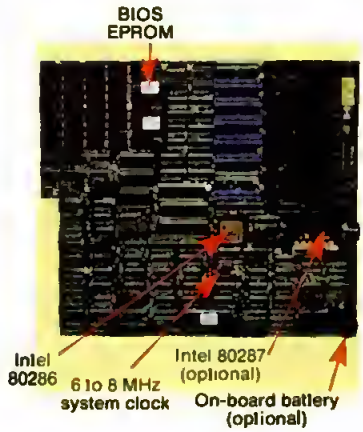
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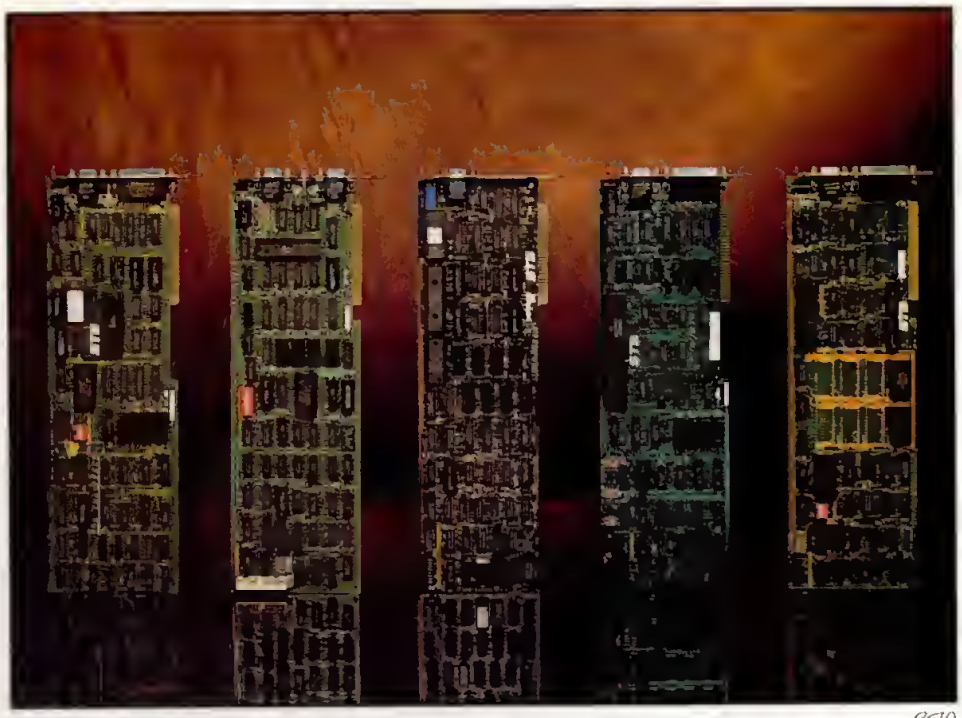
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